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TO MEET PROBLEM OF HIGHER INSURANCE.

With heavy losses in shipping on the Atlantic coast, as well as on the great lakes, within the past few weeks, the principals of leading marine companies in this country and the representatives of foreign companies are paving the way for higher insurance rates in all lines. Another meeting of the American Institute of Marine Underwriters, organized a short time ago with a view to advancing rates and otherwise strengthening the business, took place Wednesday in New York. Lake losses are being held up by the eastern underwriters as argument in favor of higher premiums, and it is quite evident that the vessel interests will be confronted with an effort to not only advance rates but to also enforce the adoption of forms of policy far less favorable to the vessel than those now in use.

This will be especially true of insurance on the great lakes, and the vessel owners of Cleveland and other leading ports have therefore already taken steps to meet the new situation. They say they are not disposed to insist upon a continuance of the present favorable form of policy or rates of the past year if it is found that the business cannot be conducted on such a basis, but they are inclined to the opinion that by co-operation on their part with the underwriters, and more direct dealings, many sources of loss may be overcome and commissions reduced, so as to bring about advantages on both sides. They are also of the opinion that there is considerable exaggeration as to the amount of actual losses compared with the premiums, and that a disposition on their part to act for the best interests of all concerned may again bring into the lake field the best of the old American companies, nearly all of which have been entirely out of the lake business of late.

A preliminary meeting with this end in view, brought about by C. A. Macdonald of Chicago, who has quite a few warm friends among lake vessel owners, was held in Cleveland Tuesday, and other meetings are planned for next week. It is said that about \$15,000,000 of vessel property was represented at this first meeting. None of the big concerns that have been placing insurance through Johnson & Higgins of New York were represented, as it was not thought they would enter into anything in the way of concerted action, at least for the present. Fifteen millions is, of course, only a part of the lake insurance, but it is thought that marked advantages could be derived from united action, even on the part of those in control of that amount of property. The outcome of the meetings now being held will depend, of course, upon the ability of Mr. Macdonald to deal with the insurance companies on the strength of support which he will have from a few important vessel interests.

COMING MEETING OF LAKE CARRIERS.

From present indications the Lake Carriers' Association will have the usual long line of important subjects to deal with at the annual meeting in Detroit about the middle of January. The date has not been fixed as yet. Up to a short time ago the only name mentioned for the presidency was that of Capt. Alex. McDougall of the American Steel Barge Co. Now Mr. W. S. Brainard of Toledo is spoken of for the place. But there will be no contest. The president is always selected by a unanimous vote. Mr. Brainard has not said that he would allow his name to be used, and probably is not aware that he has even been mentioned for the place. His gentlemanly manner and upright business methods are fully understood by members of the association. He would make a dignified president. Another Detroit river bridge measure has been introduced in congress and this subject will also again require attention from the association. Considerable interest will very probably be attached also to the Buffalo grain shoveling contract, as some of the vessel men claim they have been at a loss in having a contract of any kind this year, on account of the break in the elevator pool. They point to the \$2 shoveling rate that prevails at Midland, Owen Sound and Parry Sound and insist that the Buffalo rate should be reduced.

Mr. J. C. Gilchrist of Cleveland has taken up with Chicago underwriters the question of inserting in all grain charters at Chicago during the winter a clause providing that the grain is to be held until April 20, or even May 1, in order that the usual rush of the grain fleet in the spring before the Mackinaw straits are free of ice may be avoided. The main end in view, of course, is to shorten the season of navigation. Underwriters are favorable to the proposition, as it would reduce April losses, but they are disposed to leave the matter to vessel owners, as interference might act to their disadvantage in other ways. It is probable that this question will come up at the Detroit meeting, but the policy of the association in the past has been against such action as an organization, whatever the members may do as individuals.

The converted yacht Frolic of the United States auxiliary navy, formerly the Comanche, owned by H. M. Hanna, president of the Globe Iron Works Co., Cleveland, has been laid up for the winter at Norfolk, Va. There now appears to be little doubt that this vessel will be assigned to the Chicago naval reserves in place of the Wasp, recently described and illustrated in the Review.

General satisfaction will be given by the announcement that Secretary Long of the navy department, in accordance with his desire to class officers who have performed unusual service on shore with those rewarded for service at sea, has decided to promote to full constructors (the highest grade in the corps) Assistant Constructors Ruhm, now at the Mare Island navy yard, and Spear and Zahm, on duty at Newport News.

Subscribers to the Review who are now getting it through the marine postoffice at Detroit will please send in addresses for the winter, in order to avoid copies being missed at Detroit after the close of navigation.

NEARLY TWENTY-ONE MILLIONS.

NUMBER OF TONS OF FREIGHT PASSING TO AND FROM LAKE SUPERIOR THROUGH THE CANALS AT SAULT STE. MARIE.

St. Mary's Falls canal commerce has passed the twenty-million mark. It is 3,000,000 tons in excess of any previous year. On Dec. 1 the number of tons of freight passed through the two canals at the Sault, Canadian and American, aggregated 20,667,333. The total for the full season will be close to 21,000,000 tons, as vessels are still passing to and from Lake Superior. Complete summaries of the traffic of both canals to Dec. 1 of this years, as compared with the same date in 1897 and 1896, will be found in the following tables:

	VESSEL PASSAGES.	REGISTERED TONAGE.	FREIGHT TONS.
To Dec. 1, 1898.....	17,450	18,242,014	20,667,333
To Dec. 1, 1897.....	16,862	17,339,114	17,785,452
To Dec. 1, 1896.....	18,445	17,144,385	16,097,880

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Dec. 1, 1898.	To Dec. 1, 1897.	To Dec. 1, 1896.
Coal, anthracite, net tons.....	535,043	531,183	394,210
Coal, bituminous, net tons.....	3,198,079	2,400,533	2,605,172
Iron ore, net tons.....	11,593,286	10,569,965	7,885,769
Wheat, bushels.....	52,481,513	49,847,873	62,062,571
Flour, barrels.....	7,450,289	8,566,637	8,609,998

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO DEC. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To Dec. 1, 1898.	To Dec. 1, 1897.	To Dec. 1, 1896.
Copper	Net tons....	121,801	118,670	116,412
Grain, other than wheat	Bushels....	24,090,850	19,497,064	26,292,362
Building stone	Net tons....	4,670	6,249	17,731
Flour	Barrels.....	7,449,051	8,566,362	8,609,711
Iron ore	Net tons....	11,593,286	10,569,965	7,885,769
Iron, pig.....	Net tons....	35,983	13,316	27,948
Lumber	M. ft. b. m.	884,395	799,889	683,386
Silver ore.....	Net tons....	.....	5	240
Wheat	Bushels....	52,481,513	49,847,873	62,062,571
Unclassified freight	Net tons....	211,658	208,505	174,286
Passengers.....	Number....	20,178	19,296	18,475

WEST BOUND.

Coal, anthracite.....	Net tons....	535,043	531,183	394,210
Coal, bituminous.....	Net tons ..	3,198,079	2,400,533	2,605,172
Flour	Barrels	1,238	275	287
Grain	Bushels	37,305	34,500	2,209
Manufactured iron.....	Net tons....	212,132	120,828	93,359
Salt	Barrels	301,560	285,449	237,515
Unclassified freight.....	Net tons....	400,272	367,765	313,895
Passengers.....	Number ...	23,176	20,913	18,586

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Dec. 1, 1898.	To Dec. 1, 1897.	To Dec. 1, 1896.
West bound freight of all kinds, net tons.....	4,383,225	3,175,879	3,475,792
East bound freight of all kinds, net tons.....	16,284,108	14,609,573	12,622,088
	20,667,333	17,785,452	16,097,880

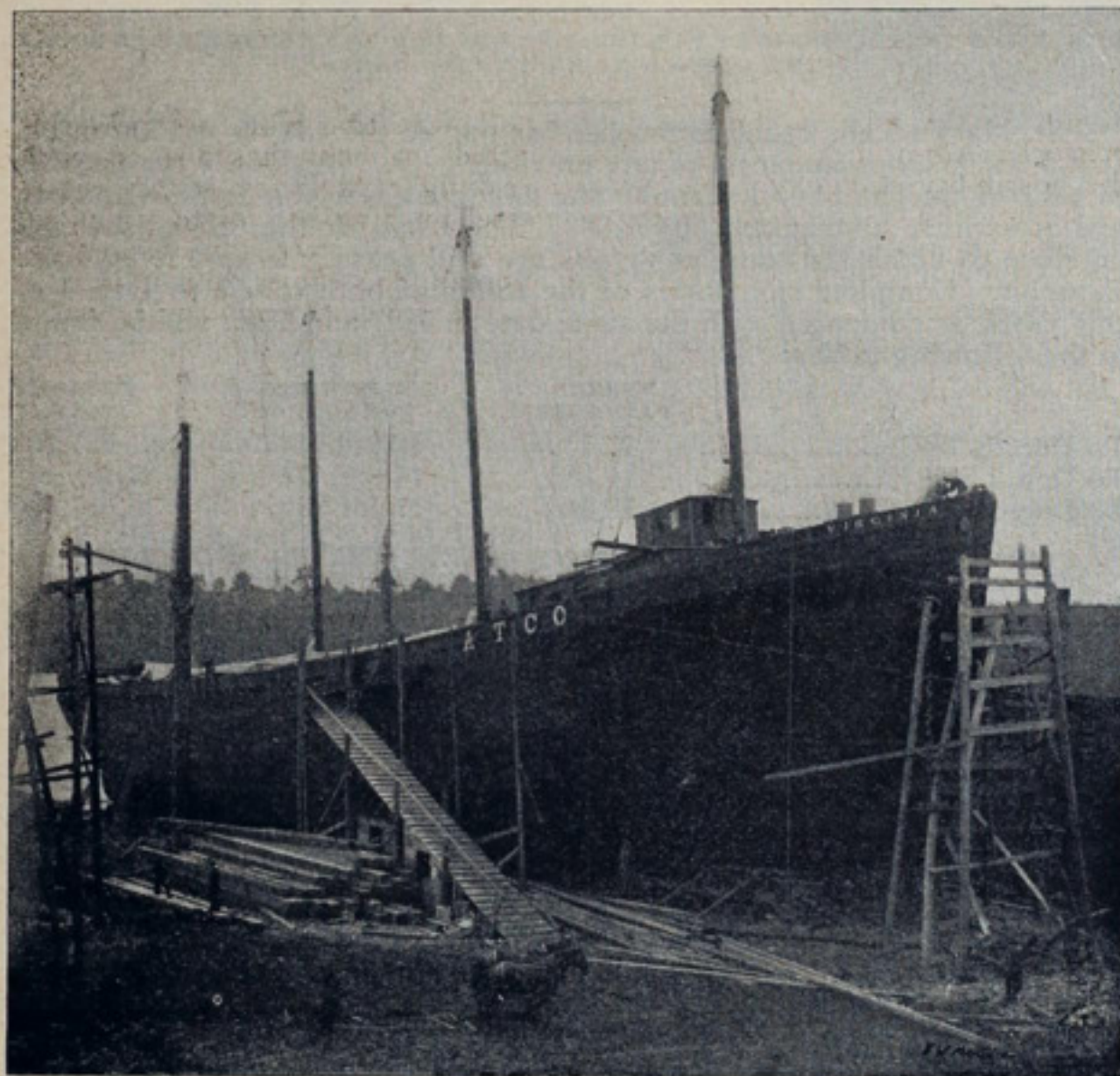
That predictions as to the extent of exports of grain to Europe this season will be justified, is evidenced by a summary just issued by Peter Wright & Sons, 305 Walnut street, Philadelphia, giving particulars of all charters of vessels publicly reported between August 1 and Nov. 7, to load full cargoes of grain at North Atlantic United States ports for European ports. During the period mentioned there were chartered 292 vessels of an approximate capacity of 33,489,600 bushels. Of this number 166 vessels of an approximate capacity of 20,168,000 bushels were still to be loaded on and after Nov. 1, 1898.

The New York Chamber of Commerce has adopted a memorial to the president of the United States urging him to convene an international congress at Washington to consider the question of making private property on the sea free from capture in time of war.

ATLANTIC COAST BARGES.

FOUR VESSELS OF EXCEPTIONAL STAUNCHNESS CONSTRUCTED FOR THE ATLANTIC TRANSPORTATION CO. BY WILLIAM ROGERS, OF BATH, ME.

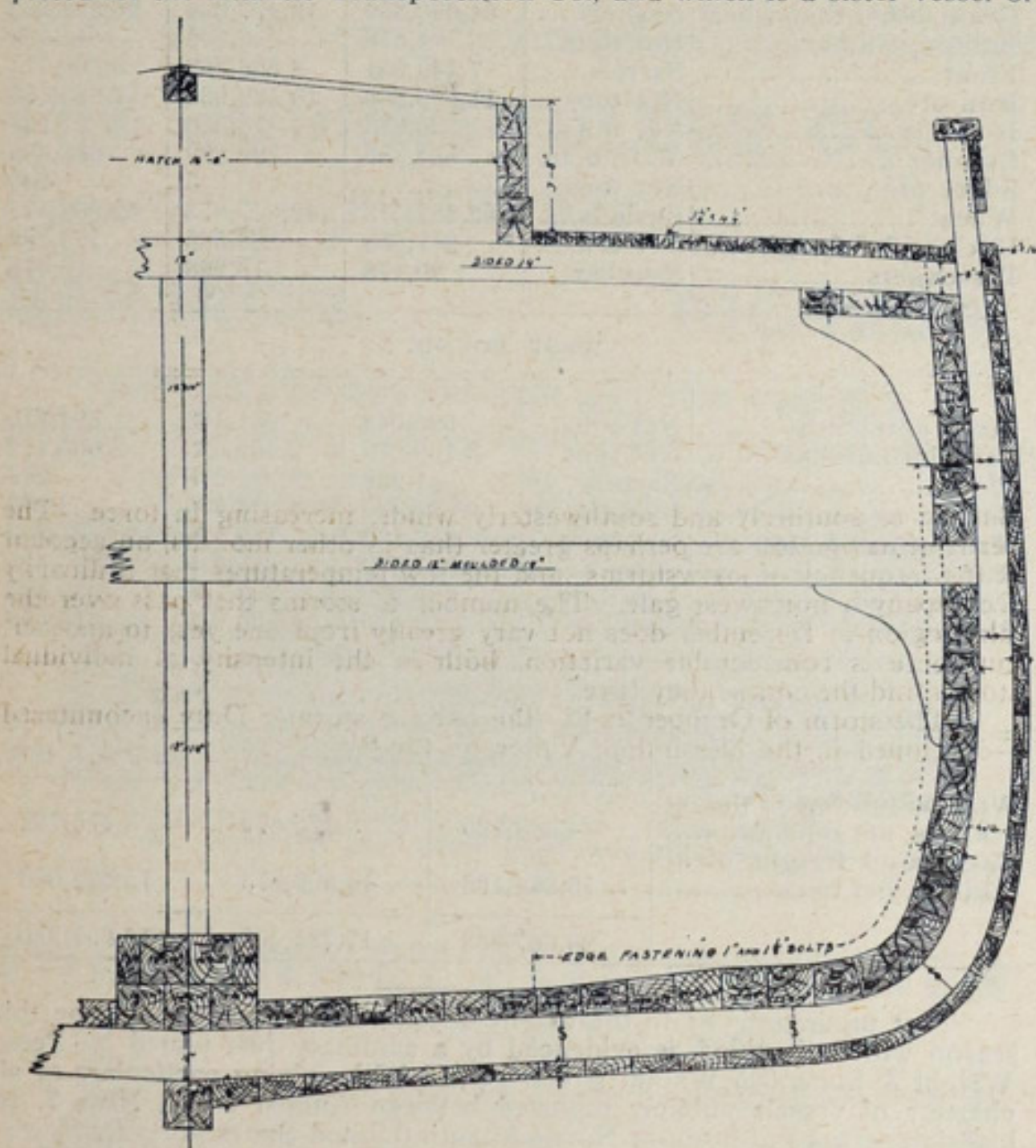
The fact that the Atlantic Transportation Co. of New York has chartered a number of lake vessels for service in the coal carrying trade between Newport News, Va., and New York, Boston and other northern coast ports, and is at the same time having built at eastern yards several wooden craft for this same service, has naturally interested both the lake



TYPE OF BARGE BUILDING FOR ATLANTIC TRANSPORTATION CO.

men and the coast builders in a comparison of the two types of vessels and their relative staunchness of construction.

The Review is enabled, through the courtesy of Mr. William Rogers, the veteran ship builder of Bath, Me., to herewith present a photo and cross sectional drawing of the barge Virginia, which he recently completed for the Atlantic Transportation Co., and which is a sister vessel of



CROSS SECTIONAL VIEW OF BARGES BUILDING BY WM. ROGERS, BATH, ME.

the West Virginia and Kentucky, also built by Mr. Rogers, and the New York, which is now on the stocks.

These barges are 236 feet keel, 44 feet beam, 19 feet depth, of 1,450 registered tonnage, and have a carrying capacity of 3,000 tons on a draught of 18 feet 6 inches. The timber in the frames is of Hachmatac above light water draught and oak, maple and birch below. The ceilings are of long leaf yellow pine, most of which is 12 inches and none less than

8 inches in thickness, well beveled and closely fitted on its edges. This material is fastened with two iron bolts in every timber which it crosses, and is edge-bolted between the frame spaces, each strake to the other, from the floor head to the rail. The outboard planking is 5 inches in thickness, fastened to the timber by two locust tree nails, one of which goes through the planking and the ceiling to the inside and is wedged at both ends, in addition to which there have been utilized butt-bolts of iron, galvanized, many of which go through both timber and ceiling, thus giving strength to every portion of the ceiling, frame and planking upon which any strain is possible to come.

The beams—a full set every four feet from centre to centre—are 12 inches in thickness and 14 inches in width, supported underneath by three shelf strakes thoroughly bolted, and under these by a full set of hanging knees, averaging from 8 to 12 inches. The necessity for great strength in these vessels will be understood when it is explained that a barge with a cargo of 3,000 tons of coal usually enters her berth for discharge at high water and is thus subject to the fall of the tide—some 8 feet—and therefore at times often rests on the bottom, which may be uneven. The vessels are equipped with all modern improvements, including Hyde windlasses, two steam wrecking pumps and Baldt stockless anchors.

TRANSFERS OF LAKE VESSELS.

The steamer Marshall F. Butters has been sold to Horace F. Butters and others of Ludington, Mich., for \$10,000. The Escanaba & Lake Michigan Transportation Co. has sold the steamer Escanaba to Capt. Chamberlain and others of Chicago for \$20,000. She will run next season between Chicago and Owen Sound. The steamer I. M. Weston has been sold by William P. Robertson of Frankfort and S. S. Burke of Desplains, Ill., to Andrew Flagsted of Montague, Mich. The price of the steamer John V. Moran, sold by the Union Transit Co. to the Crosby Transportation Co., is given as \$35,000. The wreck of the steamer N. K. Fairbank, burned at Port Colborne three years ago, has been purchased by Capt. Strong of the barge Cahoon, who will have her rebuilt at Tonawanda. She is 205 feet keel and 37 feet beam and has a capacity of 50,000 bushels of grain. It will cost in the neighborhood of \$6,000 to make the necessary repairs and the vessel will then be put in the coarse freight trade until the St. Lawrence canals are completed, when she will go to the coast. The engines of the steamer F. R. Buell will be compounded by S. F. Hodge & Co. of Detroit. Owners of the steamer Pewaukee have decided not to rebuild her and instead her machinery and boiler are to be removed and the vessel converted into an unrigged tow barge. The fire tug Menominee River, the tug Delta of the Escanaba Towing & Wrecking Co. and the steamer R. A. Seymour will be rebuilt at the dry dock of Riebolt, Wolter & Co., Sturgeon Bay, Wis.

ELECTRICITY IN LIGHT HOUSES.

An experiment in the use of electricity as an illuminating power for light-houses is to be tried at Marquette, Mich., and if successful its introduction at numerous other light houses on the lakes where lighting plants are convenient, is expected to follow speedily. The lantern in the light-house on the breakwater in the lower harbor at Marquette is to be fitted with a concentrated filament stereopticon incandescent light of fifty candle power, or just five times the power of the kerosene light at present in use. The current will be transmitted from the municipal station through a submarine cable. The first thousand feet of the breakwater is capped with a concrete superstructure with a tunnel, and through this, thoroughly imbedded in cement, the cable will pass. For the remaining 2,000 feet the cable will pass over the top of the breakwater, being held in place by cleats. The use of the electric light will obviate the necessity of a man making daily trips out to the light house—almost an impossibility during the severe gales of spring and autumn. Other light-houses at lake ports are even more exposed than that at Marquette, and it is expected, therefore, if this experiment proves successful that the introduction of the plan will be general at places where light can be secured at low cost.

GLOBE IRON WORKS ON THE COAST.

The story printed generally throughout the country, last week, to the effect that the Globe Iron Works Co. would remove its plant from Cleveland to Norfolk, Va., or some other Atlantic coast port, seems to have originated from remarks made at Norfolk by Capt. Joseph Church, who is in command of the tug W. G. Wilmot, built by the Globe company, and which is on her way to New Orleans for delivery to her owners. Capt. Church was discussing the inconvenience entailed in transferring the revenue cutters Algonquin and Onondaga to the coast. His remarks were probably exaggerated. Since the circulation of the report, however, citizens of Norfolk and other available ports have shown such a disposition to hold out inducements to the Globe company to locate a branch yard that the officials of the company are rather taken with the idea. Vice President R. L. Ireland said the other day that if the citizens of some coast city would donate a site and build a dock, as was done in the case of another concern, the Globe company would establish a yard on the coast.

BOILERS FOR THE ALERT.

A feature of the refitting of the United States cruiser Alert, now in progress at the Mare Island navy yard, Cal., will be the provision of two large boilers now being manufactured by the Babcock & Wilcox Co. The boilers will be shipped across the continent on four cars and made to such dimensions that they will readily lower through a 10-foot hatch and be directly installed in the vessel. The boilers will take the place of two Scotch boilers, which it will be necessary to cut into pieces in order to remove them from the ship. The gunboat Ranger will also come out of the yard a practically new vessel. A new deck will be laid, a new rig provided and 10 feet added to her smokestack. She is expected to be ready to go into commission early in January. The Camanche and Iroquois, which are in dry dock, will probably go to Honolulu, the former as a guard ship and the latter as a tender to take fresh water out to battleships which cannot enter the harbor. Work on the Albattross is well in hand.

ICE BREAKING STEAMER.

THE ERMACK, NOW BUILDING FOR THE RUSSIAN GOVERNMENT BY ARMSTRONG, WHITWORTH & CO.—MOST POWERFUL VESSEL OF HER KIND IN THE WORLD.

No small degree of interest is felt in America in the ice breaking steamer Ermack, building for the Russian government, and which was recently launched at Sir. W. G. Armstrong, Whitworth & Co.'s works in England. Representatives of the Russian government, before contracting for this vessel, visited the great lakes and made an inspection of the car ferries in service here. The rather superficial descriptions of the new steamer thus far given out make it apparent that the Russian engineers have utilized many of the valuable practical features found in such vessels in this country. It is also notable that Howden hot draught has been applied to all of the six double-ended boilers with which the vessel is fitted.

This ocean-going steamer, which is the largest, heaviest and most powerful ice-breaking vessel as yet built, is 305 feet over all, 71 feet beam and 42 feet 6 inches depth, and when fully loaded will have a displacement of 8,000 tons and a draught of 25 feet. The hull is extraordinarily strong. The frames are spaced 2 feet apart, and intermediate frames are fitted between them from the main to the orlop deck, so that practically the frame spacing is 1 foot. A belt of specially heavy flush plating is worked all fore and aft. Special attention has been given to the unsinkability of the vessel. The arrangement of the inner bottom is somewhat the same as generally obtains in war vessels. The wing bulkheads are carried up to the upper deck, and are, of course, water-tight, the wing compartments forming coal bunkers and careening tanks in case of need. The number of water-tight compartments is forty-eight. The testing to which the

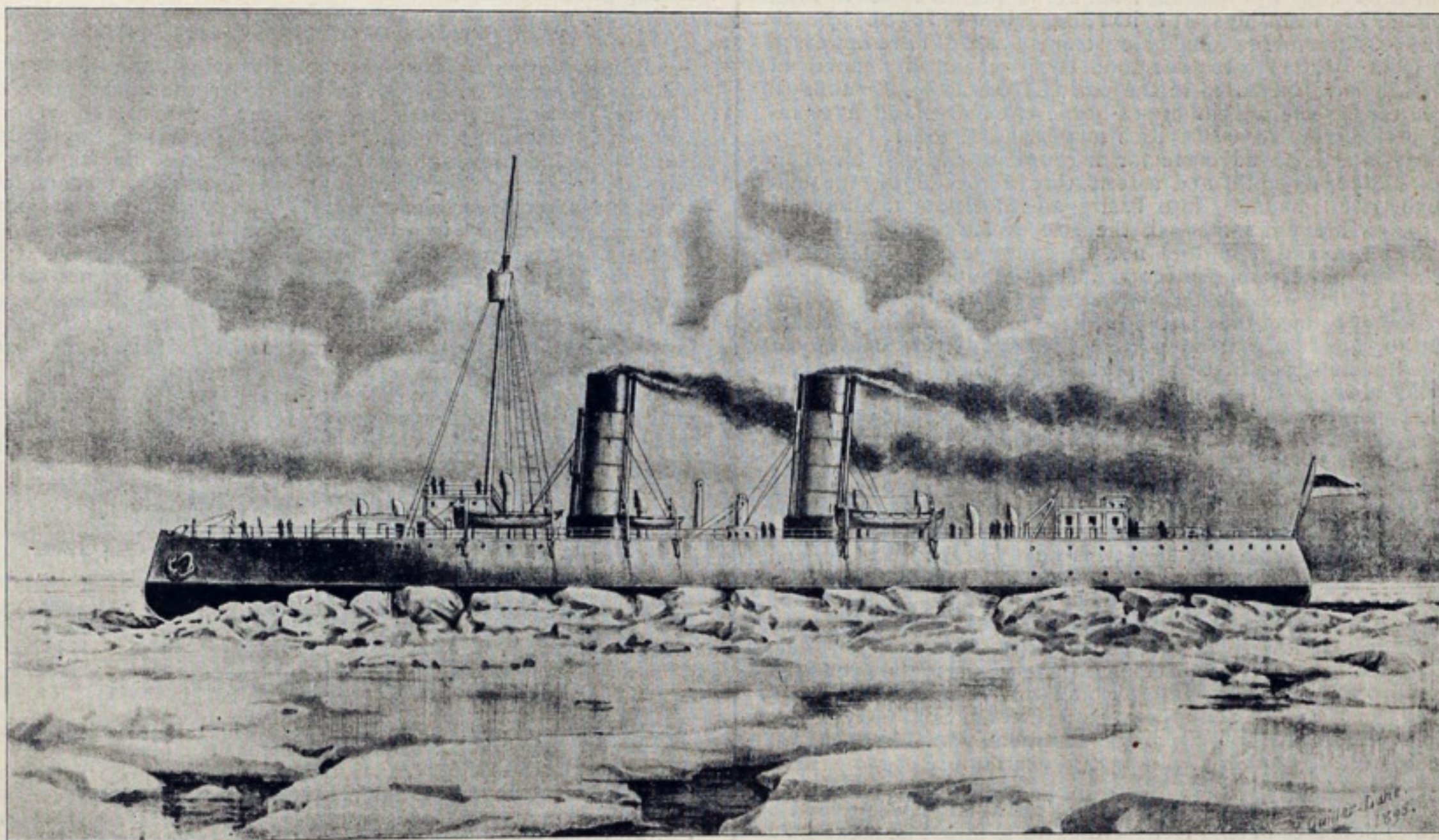
come the breaking strain thus produced, the momentum of the vessel is expended in lifting the bow on to the top of the ice; meanwhile the water supporting the ice is violently disturbed by the action of a propeller arranged under the cutaway bow, so that under the effect of the weight of the vessel acting above, and enhanced by absence of support below, the ice gradually yields. The action thus described will take place continuously when working in thick ice.

The Ermack, a picture of which from London Engineering is here-with presented, has accommodation for thirty first-class passengers, ten second-class, and fifty third-class passengers, besides that for the captain, officers, engineers, and crew of the vessel. There is ample capacity for cargo, so that the vessel, in addition to convoying merchant vessels through the ice, is herself capable of carrying a heavy cargo. The stern is cut to form a recess, into which the stern of another vessel can be securely lashed and thus obtain the utmost protection from her powerful consort. Admiral Makaroff, who projected the boat, has also in view the possibility of augmenting the ice-breaking capabilities of this vessel by having the assistance of a second vessel pushing her, as to which he has already made experiments. The convoying of merchant steamers is, of course, the primary object of the ice-breaking steamer, and it is confidently expected that in a very short time the principal trade routes which depend on Baltic ports will be kept open in winter.

DECEMBER STORMS ON THE GREAT LAKES.

The subject of December storms and storm tracks is discussed at some length in the latest issue of the monthly chart from the United States weather bureau. The summary is in part as follows:

"The storms of December, in common with those of other months, approach from a westerly quarter. Their coming is generally preceded by warm weather for the season, increasing cloudiness, and northeasterly



ICE BREAKING STEAMER ERMACK, BUILDING IN ENGLAND FOR THE RUSSIAN GOVERNMENT.

vessel has been subjected was extremely severe. Every compartment was filled with water and pressed by a column of water of the height of the upper deck. This was a difficult undertaking, as the large compartments have a capacity of about 2,000 tons, and the supporting of the vessel while all the extra weight was added was a process which involved a great deal of thought and care. No such severe test as this has ever before been applied to a vessel on the blocks, and it speaks well for the strength of the structure that there was no case of distortion under the enormous strain.

The propelling machinery consists of four sets of triple expansion engines, each capable of indicating 2500 horse power. The scantlings throughout have been arranged so that the propellers may strike a solid body and bring the engines up all standing without breakage; in other words, the propellers, shafting, and rods are sufficiently strong to overcome the highest pressure available in the cylinders. Very complete arrangements are made for ensuring the outlet and discharge of the circulating water, and keeping all the other sea valves free.

The universal interest felt in the vessel is evidenced by the fact that representatives of the Chinese, Japanese, Chilean, Portuguese and American governments attended the launch. The design of the Ermack contains only half an adoption of the old principle of breaking down the ice by providing a cutaway bow which enables the vessel to run partially up onto the ice, the theory being that the weight thus applied would be sufficient to break the ice. It will be remembered, however, from the experience of some of the ice crushers on the great lakes that this theory has not always been successfully carried out. At the same time it was apparent to the designers that the way to minimize the blow upon so solid a material as 10-foot ice is to prolong the period of impact as much as possible. This has been attempted by designing the bow with a very long overhang, so that the attack on the ice takes the form of a sliding blow, and if the resistance encountered is more than sufficient to over-

shifting to southerly and southwesterly winds, increasing in force. The perils of navigation are perhaps greater than in other months, on account of the frequency of snowstorms and the low temperatures that ordinarily accompany a northwest gale. The number of storms that pass over the lake region in December does not vary greatly from one year to another, but there is considerable variation, both in the intensity of individual storms and the course they take.

"The storm of October 24-27—the one the steamer Doty encountered—developed in the Mississippi Valley on the 24th, on which date warm, partly cloudy weather, with southerly winds, prevailed in the lake region. On the morning of the 25th, the storm having advanced to the lower end of Lake Michigan, high northerly winds and rain prevailed from the eastern end of Lake Superior southward to Chicago. The movement of the storm during the succeeding twenty-four hours was very slow, and heavy, thick weather, with rain or snow, prevailed throughout the entire lake region. The highest wind velocities were: Middle Island, 34 miles north; Buffalo, 44 west; Green Bay, 36 north. The period from Oct. 16 to Nov. 15 was exceedingly stormy, especially from Oct. 24 to 27 and Nov. 9 to 11. Fifty-three vessels were damaged to a greater or less extent, while many others received injuries of a minor character. The largest number of disasters occurred on October 26-27. Seven vessels, having a total valuation of \$312,434, became total losses and twenty-six lives were lost. The total valuation of all craft and cargoes lost during the period Oct. 16 to Nov. 15 was \$499,934. Add to this the amount of damages sustained to other vessels, \$124,600, and we have a loss to vessel interests on the great lakes of over one-half million dollars (\$624,534) within thirty days. The harbors around the lakes suffered greatly, that of Chicago alone sustaining damages to the amount of \$81,500."

Davis & Sons, Kingston, Ont., are building a steam yacht for Rev. Evans who desires the craft for use on the river Jordan in Palestine.

FUTURE REQUIREMENTS IN HARBORS.

MR. E. L. CORTHELL'S VIEWS OF WHAT IS NEEDED FOR SHIPS OF THE FUTURE—IMPROVEMENTS UNDER WAY AT LEADING PORTS.

Mr. E. L. Corthell, well-known engineer of Chicago, who has made canals and harbor improvements a life study, contributed a very interesting paper to one of the recent meetings of the American Association for the Advancement of Science. The main purpose of the paper was to furnish reliable data for an opinion as to the future requirements in regard to the depth and other dimensions of channels in the ports of the world, in order that the authorities concerned might know what they have before them in the way of harbor improvements. For the purposes of his paper, the author made elaborate investigations over a period of seven years, with the following deductions: The average length of the twenty largest steamships, which was 230 feet in 1848, will be 765 feet in 1923 and 1,000 feet in 1948. The breadth will increase from 36.2 feet in 1848 to 80 feet in 1923 and 100 feet in 1948. The depth will increase from 23 feet in 1848 to 41 feet in 1923 and 43 feet in 1948. The loaded draught will increase from 19 feet in 1848 to 31 feet in 1923 and 33 feet in 1948. The speed will increase from 9.2 knots in 1848 to 21 knots in 1923 and 24 knots in 1948. The tonnage will increase from 1,430 in 1848 to 24,000 in 1923 and 30,000 in 1948. The number of graving docks 500 feet long and over will increase from 23 in 1881 to 176 in 1948. The speed of the fastest steamships will increase from 10 knots in 1848 to 30 knots in 1948. The total number of sailing ships will decrease from 56,281 in 1873 to 10,800 in 1948. The total sailing tonnage will decrease in the same period from 14,185,836 to 3,241,000. The average tonnage of sailing vessels in the same period will remain practically stationary, being 252 in 1873 and 300 in 1948. The total number of steamships will increase from 242 in 1848 to 16,685 in 1948. The total tonnage of steamships will increase from 74,700 in 1848 to 45,000,000 in 1948. The average tonnage of steamships will have increased in this period from 310 to 2,700. The total effective carrying power of steam and sail will have increased in the period from 16,500,000 tons to over 138,000,000 tons. The weight of sea-borne commerce will have increased in the period from 26,500,000 tons to 435,000,000 tons.

Mr. Corthell is a great advocate for harbors, canals and channels being made of increased depth, and asserts that if the depths through outlying bars, in river channels, into basins and docks, and alongside wharves and quays, are not increased, the size of steamships will not much further increase, and if it does not, he continues, the limit is in sight to the carrying power and the economies of commerce. This matter is not, however, being overlooked, and in reply to the question, "What is the engineer doing to meet the desired increase in the draught of steam ships?" the author answers that no port of the world will, in the near future, be classed or used as a first-class port which will not readily admit steamers drawing at least 30 feet of water. This means, he adds, 35 feet in the entrance channels, through sea bars; 32 feet in river channels and other entrance approaches, and basins, and along the quays and wharves. What is being done to secure these depths? "First and most important, the Suez canal, which was built with a depth of 26 feet, is now nearly deepened to 28½ feet, and the International Engineering Commission has made plans for the next deepening to 9 meters—practically 30 feet. The Amsterdam canal, opened with only 23 feet, is nearly deepened to 30 feet. The new Kaiser Wilhelm canal has nearly 30 feet. Liverpool has now an entrance channel of practically over 30 feet at low tide—27 feet to 57 feet. Southampton has 30 feet at low tide. New York will have by the present plans 35 feet at low tide, Boston will have 30 feet at low tide, Philadelphia has the same. New Orleans, in the plans for an enlarged channel way, will propose to the United States government a minimum depth on the sea bar of 35 feet, and at least 32 feet in the South-West pass and Mississippi river. Galveston, by the present plans now being carried out, will have 30 feet. Hamburg will, in the near future, have a deep channel way to the sea adequate for the largest vessels. Antwerp has a sea entrance 30 feet deep, a river depth of 31 feet at high water, and a projected depth of port area of 32½ feet. Other ports might be mentioned where deeper channels are in progress of construction or are projected. Liverpool is being improved beyond all other ports of the world, and is expending immense sums to provide for the steamships of the future. It is widening and deepening the docks to accommodate vessels up to 900 feet in length and to 90 feet beam and 36 feet draught. It is building a dry dock for vessels of this class, and is making plans for one 1,000 feet long. At London the vexatious bars and tortuous channels near the mouth of the Thames, through which it is dangerous in certain stages of tide and in fog to navigate vessels drawing over 26 feet, are to be removed and improved, and a navigable depth of 30 feet provided.

RIVER AND HARBOR BILL EXPECTED.

Shipping interests on the great lakes and throughout the country generally will welcome the announcement of the selection of Mr. T. E. Burton of Ohio for the chairmanship of the river and harbor committee of the house of representatives. His selection was unanimous, five republicans and seven democrats on the committee voting for the resolution asking the speaker to make the appointment. It is no exaggeration to say that the selection of Mr. Burton is the best which could have been made. He has made the subject of river and harbor improvements a study ever since he entered congress, and his wonderful powers of application and discernment have enabled him to become a master of its every detail. It is related of him that he two years ago did something very few men in congress are capable of doing. Fewer still would do it if they could. In order to show that our appropriations for river and harbor work are not extravagant, he translated a technical report on similar work done in France. The task required an intimate knowledge of the French language, both technical and mathematical knowledge as well. Merely for the sake of enforcing that one point, an important one to be sure, he did as much, if not more, work than it would require to make a good translation of a French novel. The committee at the session at which Mr. Burton was chosen decided to at once begin the preparation of a river and harbor bill.

TOTAL ORE OUTPUT—MESABI MINES.

It is now more than probable that the output of iron ore from the entire Lake Superior region will reach 13,750,000 tons, against 12,469,638 tons in 1897. Official reports to the ore sales agents of Cleveland show a total of 13,481,711 tons by lake to Dec. 1, to which must be added shipments since the first of the month, as well as all-rail shipments during the year.

Mines on the Mesabi range that shipped over the Duluth, Mesabi & Northern road during the past season increased the aggregate shipments over those of 1897 by 297,664 gross tons. The following statement shows shipments of these mines during the past two years:

	1898.	1897.
Franklin	200,273	30,128
Adams	390,770	175,800
Commodore	77,946	60,797
Lone Jack and Mesabi Mountain.....	385,792	601,072
Mountain Iron	650,021	773,538
Rust	38,385	.....
Burt	15,274	.....
Hull	75,851	.....
Pillsbury	99,691	.....
Ohio	65,579	.....
Sellers	112,763	.....
Biwabik	383,179	427,466
Duluth	112,155	.....
*Lake Superior group .....	.....	259,910
Day	18,725	.....
Totals	2,626,384	2,328,720

*Mines of the Lake Superior group—Rust, Burt and Hull—are given separately in 1898 column.

BOAT DETACHING DEVICES.

Editor Marine Review:—In the editorial column of one of the marine journals of recent date is an article under the head of "Boat Davit Tackles," which impresses one with the fact that the writer is conversant with the subject in hand and evidently has a knowledge of boat handling gained through practical experience. But in this article it is suggested that the "light-house supply boats and tenders, coast survey boats and other departmental tonnage, even including the navy proper," make exhaustive tests in order that a boat device be selected for adoption by the board of supervising inspectors of steam vessels. Allow me to ask, why is this necessary? Why must other branches of the government be called upon to perform duties that by law are delegated to a body of men appointed for this purpose? They are paid by the people for doing this work, why do they not do it? Must other departments "be called upon to do their work?" Are they incompetent? If so, let us have a new deal and give us men for this work who for practical knowledge and recent experiences are up to date. Why is not this board composed of men selected for their ability and practical knowledge, and who within the last thirty years at least have seen a seaway? There are plenty of such men who could be selected from the retired lists of the navy and the revenue cutter service, whose decisions and rules could be comprehended and would be in accord with the times instead of befogging and confusing those to whom they apply. There is such a thing as one outliving his usefulness, and in these days of progress it is demanded that those having supervision over matters of such vital import should be men who keep up with the times.

Detroit, Dec. 5, 1898.

Progress.

DEMORALIZED CONDITION OF CANAL TRAFFIC.

With the governor of New York urging criminal proceedings against officials of the public works department in connection with the expenditure of the \$9,000,000 canal improvement appropriation, and with a marked decline in traffic again this year, affairs of the state canals are certainly in a demoralized condition. The Erie canal closes the year with quite as poor a showing as in former years. Indeed the movement of grain shows a falling off of nearly 2,000,000 bushels from last season. The first month of the season, it will be remembered, was wasted by reason of breaks in the canal, and then the railroads made a demand to carry practically all the rye and oats, grains that have usually been turned over to the boats, and whereby the latter were practically restricted to corn, barley and flaxseed. Some of the canal boat men declare that the season has been the worst in thirty-three years. It is claimed that not one pair of boats in fifty has netted enough to equal the depreciation in value, which, from an estimate based on the insurance schedule, is fixed at \$200 per year. One of the numerous causes leading up to decline in canal traffic is found in the fact that whereas some years ago railroad cars had a capacity of 350 bushels, they now have a capacity of from 1,000 to 1,100 bushels.

The strenuous service required occasionally from the engineer force on board steam vessels is illustrated by an occurrence on the U. S. S. Castine. During action and while the forced draught was in use a socket bolt in a back connection at the farthest interior extremity of the furnace became loose and steam was pouring in upon the fire. One of the boiler-makers, named Huntley, ordered the forced draught to be turned off and the fires banked with fresh coal. Taking a plank, he threw it into the furnace on the top of the wet coal, and then climbed back to the place where the steam was rushing from the loosened socket. For three minutes he remained inside the furnace. His friends drew him out of the door; the forced draught was turned on, and in a few minutes the ship was proceeding on her way as though nothing had happened. —Army and Navy Journal.

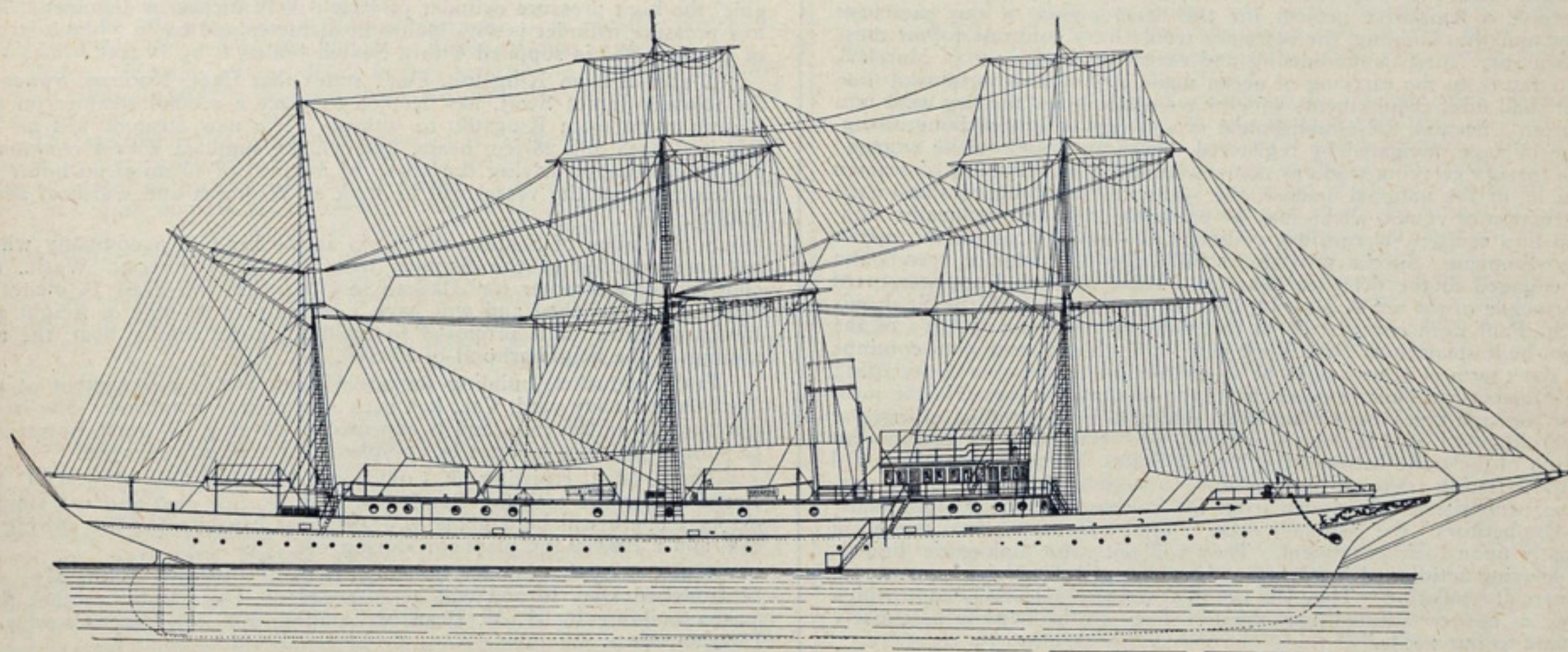
A widespread sense of loss has been occasioned in shipping circles by the death, last Thursday, of Mr. J. Taylor Gause, president of the Harlan & Hollingsworth Co. of Wilmington, Del., at the age of seventy-five years. Mr. Gause took up employment at the Harlan & Hollingsworth works when sixteen years of age, and fifteen years later was made a member of the firm. He was made president in 1883.

PAYNE YACHT APHRODITE.

FINEST PLEASURE CRAFT AFLOAT—DESIGNED BY GENERAL SUPERINTENDENT CHARLES HANSCOM, AND LAUNCHED RECENTLY AT THE BATH IRON WORKS, BATH, ME.

The large steam yacht Aphrodite was launched successfully from the yard of the Bath Iron Works, Bath, Maine, Thursday, Dec. 1. This vessel was designed throughout by Mr. Charles R. Hanscom, general superintendent of the Bath works for Col. O. H. Payne of New York City. The Aphrodite will have the distinction of being the largest, most luxuriously appointed, and speediest sea-going steam yacht ever constructed in this country. No expense is being spared in making this vessel just what the specifications insist upon, viz., the finest pleasure craft of her type afloat.

The hull of the Aphrodite measures 303 feet over all, 260 feet between perpendiculars, 35 feet 6 inches beam, and she will draw when loaded 16 feet of water. The steel hull is remarkably strong and rigid, and her scantlings are in excess of the requirements of the rules of the American Shipmasters, British Lloyds, or the United States Standard Association. The yacht has a flat keel instead of the usual side bar keel. She has moderate deadrise, an easy bilge with graceful curving sides, and the usual tumble home. The bow lines flare above the load water line so as to make the vessel more comfortable in a head sea. She is fitted with bilge keels, or rolling chocks, 24 inches deep and 140 feet long. No permanent ballast will be necessary to insure sufficient initial stability, but four large water ballast tanks are fitted, two forward and two aft of the machinery space, so that the displacement can be increased, and the trim, when light, regulated at will. The hull of the vessel is divided into fifteen water-tight compartments. There are no less than nine



PAYNE YACHT APHRODITE, BUILDING BY THE BATH IRON WORKS, AND DESIGNED BY GENERAL SUPERINTENDENT CHAS. HANSCOM OF THAT INSTITUTION.

athwartship steel bulkheads and no doors are cut in any of them unless absolutely necessary.

There are many innovations in the construction of this interesting vessel. The main deck is plated with heavy steel throughout the entire length. A top-gallant forecastle deck is fitted forward, with full headroom between it and the main deck. The large 160-foot deck house is a steel structure of great strength and rigidity, but this metal work will soon be concealed by handsome panelled mahogany. Large, round vertical sliding air ports are fitted in this house. These are more efficient on an ocean-going vessel, and they also tend to give a much more "shippy" appearance than the rectangular windows. There is a clear deck space of about 7 feet between the rail and the deck house on each side. It is apparently the desire of the owner to secure ample deck space and freedom at sea rather than large rooms in which to entertain. The Aphrodite has a rounding stern with a medium overhang, and the stern lines of the vessel are such as warrant good behavior when running before a heavy sea.

The interior arrangement of the vessel will be of the most superb character, the wood-work being handsomely carved. Most of it is now in the joiner shop of the Bath works ready to go on board. The yacht is to be fitted with all modern appliances—electric lights, two search lights, storage battery, steam windlass, etc.

Engines of the Aphrodite will be the largest ever placed on board a private-owned pleasure craft. The cylinders are 28, 43 and 70 inches in diameter respectively, and the stroke is 36 inches. There are four massive single-ended boilers, all ready to be lowered into the vessel. At natural draught these boilers will supply steam for 3200 I. H. P. There is no yacht afloat today that is fitted with machinery capable of developing this power at natural draught. The speed of the Aphrodite under steam alone, without forcing, will be at least 15 knots, and this she will be able to maintain on a long run, owing to her great boiler power and large coal capacity. Under forced draught she will make over 17 knots.

The vessel will have a most pleasing sail plan. She is to be barge-rigged, two-thirds full sail power, and will spread in all about 17,000 square feet of canvas. These sails will give steadiness in a seaway, and in an emergency will enable her to make fair speed under canvas alone. The Aphrodite has been constructed in a new substantial steel ship house 316 feet long and 50 feet wide. Pneumatic tools have been used in her

construction, and owing to the Bath Iron Works having most excellent facilities for this high class of work, they have turned out in a very short time a hull that for strength, beauty, and fine workmanship is excelled by none at present afloat.

LAKE VESSELS ON THE ATLANTIC.

Mr. J. C. Gilchrist of Cleveland, agent of the Atlantic Transportation Co. of New York in its dealings with vessel owners on the great tracts, especially in view of the probability of great depreciation in their come to him, that next season will see a great influx of representatives of Atlantic coast shipping interests to the lake district for the purpose of purchasing or chartering craft of a size and type which will permit their transfer to the coast. Mr. Gilchrist said that arrangements would be made to have the boats which are tied up for the winter at Montreal proceed down the coast as early as possible in the spring.

Not all of the lake owners who chartered their vessels for Atlantic coast service are satisfied with the kind of security that attends the contracts, especially in view of the probability of great depreciation in their property, and it will be difficult, therefore, for any of the coast companies to charter more vessels for next season, except under the very best conditions of security. Lake owners are disposed to hold out for sales at reasonable figures, in preference to charter at any price. It is quite evident, in view of recent storms on the coast and reports regarding some of the lake vessels that encountered difficulties, that the Atlantic company is making a mistake if they are trying to have a steamer like the Katahdin, for instance, tow three barges. The vessels are, of course, fully insured, and lake owners are not troubled on that score, but it has not been the practice on the lakes to have steamers like those that have gone to the coast tow more than one barge, except in summer months when they might take two.

Some of the vessels under charter by the Atlantic company were caught in the recent severe gales on the Atlantic coast and suffered in varying degrees. The lack of wisdom in attempting to have a lake steamer of Welland canal dimensions tow three barges was strikingly illustrated by the experience of the Katahdin and her barges. The barges Thomas L. Parker, W. D. Becker and H. D. Alverson, comprising the Katahdin's tow, all broke away. The two former were later towed into Booth Bay harbor badly damaged, while the Alverson went ashore near Popham beach and is in even worse condition. For a time it seemed to the crew of the Katahdin that the steamer would founder, the steam pumps being out of order, and this was prevented only by all hands bailing out the fire-room with buckets and thus keeping the fires under the boilers from being put out. The barges Iron City, Charles Foster and H. A. Hawgood are also reported to have been jammed up against the bulkhead at the new state dock, South Boston. The steamer John J. Hill, which was built at Marine City but which has been in the coast trade for several years, went ashore at Wollaston. It is said that the task of getting this vessel into deep water will be a difficult one, as she lies broadside on the beach, quite a distance from the water. Considerable dredging will be necessary before the wreckers can get to work.

Telegrams from Gloucester, Mass., state that the schooner Porter, owned in Detroit, was abandoned off that port, with all her sails and rigging carried away and in a sinking condition. The Porter, which will very probably prove a total loss, was twenty-four years old, and was a 747-ton schooner, valued at about \$20,000 and fully insured by the Atlantic Transportation Co.

Wm. H. Webb, of New York, founder of Webb's Academy and Home, an institution devoted to the schooling of young men in the art of ship building and to the care of aged ship builders, has recently issued in two large volumes (pages of 20 by 16 inches) plans of wooden vessels which he built in New York from 1840 to 1869. The collection is selected from 150 plans of various kinds and descriptions from a fishing smack to the largest clipper ships and vessels of war. Mr. Webb announces that the book is dedicated to the public, more especially for the benefit of those engaged in the study of the art and science of ship building. The plans are excellent specimens of art in printing and engraving, and were undoubtedly gotten out at great cost.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

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When Senator Hanna said in the Review, not long ago, that the present congress would take some action toward creating anew an American seagoing merchant marine, he was evidently fully informed as to the policy of the administration in this regard, now set forth in the president's message, in the report of the secretary of the treasury, and more fully in the report of the commissioner of navigation, printed elsewhere in this issue. The two important administration measures in the present congress will be the Nicaragua canal bill and a shipping measure. They will be closely related to each other, as the southern representatives who want the canal will be prevailed upon to support the proposed shipping legislation. That the administration is determined upon a policy of expansion in our merchant marine may be understood from the extent to which the subject is dealt with, not only in the reports of Secretary Gage, the commissioner of navigation and the postmaster-general, but also in the president's message. Strange to say, the present commissioner of navigation, Mr. E. T. Chamberlain, although appointed under the Cleveland administration, gives out a report that is in all respects in accord with the recommendations of the secretary of the treasury, so much so that Mr. Gage refers the congress to it for the details of his recommendations. To evolve a legislative project for the development of our merchant marine and ship building, the secretary would have congress follow these propositions: First, a remodeling and extension of the act of March 3, 1891, relating to the carrying of ocean mails in American steamships, so that it shall meet requirements which have arisen since the law went into operation. Second, the establishment of a system of graded bounties upon the mileage navigated by registered American vessels while engaged in the foreign carrying trade as compensation for the training of seamen available for the national defense, the system to have regard also to the construction of vessels which may be promptly and economically converted into cruisers, troopships, colliers and supply ships for the use of the government. Special provision should also be made for vessels and men engaged in the deep-sea fisheries. Third, extended application of the principle of the act of May 10, 1892, by virtue of which the St. Louis and St. Paul were constructed in this country upon the registry of the foreign-built steamships New York and Paris, this extension to continue for a short term of years and to be so guarded as to preserve the coasting trade to American-built vessels. Fourth, a moderate increase in the rates of our tonnage taxes, equalizing them with the corresponding charges at present imposed at London, Liverpool, and Hamburg. Fifth, the restriction of the trade between the United States, Porto Rico and Hawaii and the coasting trade of those islands to vessels of American registry. "These propositions are drawn from the current practices of our maritime competitors," the secretary says. "They can be put into operation promptly upon their enactment. They will not raise diplomatic difficulties, delaying action and involving us in prolonged discussion or a war of commercial retaliation. They will not raise political questions upon which parties, as now constituted, may divide. They are believed to be entirely adequate to our needs."

ANNUAL MEETING OF NAVAL ENGINEERS.

The annual meeting of the American Society of Naval Engineers will be held in Washington, Jan. 10, 1899, but, owing to the conditions which have combined to prevent the great majority of members from securing leisure necessary for framing such papers as would insure special interest to a meeting so closely following the war, the council has not fully decided upon the wisdom of issuing such a general call as was given last year. In this connection the members and associates interested have been requested to communicate with the secretary of the society, stating in what way they will be able to further the interests of such a general meeting if called. Unless a special notice is issued later the annual meeting will be held as prior to last year, and without extraordinary features.

Printed copies of the by-laws adopted by general vote on Oct. 13, have been forwarded to members. The election of officers for the ensuing year will take place at the January meeting. The present officers are: President, Engineer H. Webster; secretary and treasurer, Chief Engineer A. B. Willits; council, Chief Engineers H. Webster, A. B. Willits and George W. Baird and Passed-Assistant Engineers W. W. White and Emil Theiss.

In a recent notice to members the secretary says: "For the information of our associates, who may not understand why we have had so little written upon the war experiences from an engineering standpoint, we would state that nearly all the ships from Cuban waters have been undergoing repairs and overhauling at navy yards ever since the cessation of hostilities, every improvement suggested by the war experience being, as far as possible, added, and all work hastened to such a degree as to make the engineer officers even busier, and their time more fully occupied, than when on the blockade."

The Neafe & Levy Ship & Engine Building Co. of Philadelphia, is elated over the remarkable showing made by the steamer City of Seattle, which they built in 1890 for the Puget Sound & Alaska Steamship Co. During a period of fourteen months, this vessel steamed 56,578 miles in thirty voyages, which is an average of nearly 135 miles per day. A round trip comprised 1,900 miles. The City of Seattle is a single-screw steel-hulled vessel with a length over all of 259 feet, beam 40 feet and depth 22 feet. She is equipped with a compound engine with cylinders 32 and 60 inches by 36-inch stroke, and steam is supplied from two Scotch boilers.

THE CONTRACT BUDGET.

DEVELOPMENTS OF THE WEEK IN THE MAKING OF NEW CONTRACTS AND THE FULFILLMENT OF OTHERS—SHIP BUILDING INDUSTRY ACTIVE.

Bids for the 40-ton crane for Port Royal were opened at the navy department, Washington, last week. The bidders were: Morgan Engineering Co., Alliance, O., price for crane, f. o. b. Alliance, to include erecting expenses but not freight, \$49,687; price for crane erected and delivered, \$54,187; Brown Hoisting & Conveying Machine Co., Cleveland, \$44,500; William H. Sellers & Co., \$42,368; American Hoist & Derrick Co., \$39,950; E. M. Bailey & Co., Charleston, S. C., \$12,500. For a 40-ton crane of the type specified this last named price is looked upon as being so low that it is doubtful that the department will consider it. Another great drawback that the E. M. Bailey Co. will have to contend with is the fact that the bid was not accompanied by a certified check or bond as is required. It is not probable that in this case the award will be made to the lowest bidder.

Work on all the vessels on the stocks at the Roach ship yard, Chester, Pa., is well in hand. The engines and boilers have been placed aboard the Standard Oil Co.'s steamer Atlas and it is expected that she will be ready to leave the yard Jan. 1. The steamers building for the Old Dominion line are practically all plated and the main decks are framed in, but there is still considerable work to be done before they can be launched. The Pennsylvania Co.'s ferryboat is well along toward the launching point, the decks having been laid and the bulkheads all but completed.

The R. M. Spedden Co., Baltimore, Md., has launched the tug Solicitor building for the Lewis Wagner Lumber Co. The Solicitor is a wooden hull vessel 75 feet long, with 17 feet 3 inches beam and a depth of hold of 9 feet 2 inches. She is fitted with a Steeple compound engine, the high pressure cylinder of which is 10 inches in diameter. The low pressure cylinder is 20½ inches in diameter and has a 20-inch stroke of piston. She is supplied with a Scotch boiler, 8 by 10 feet.

A special from Kingston, Ont., states that Capt. Noonan, owner of the steamer James Swift, has decided to place a second steamer on the Rideau route from Kingston to Ottawa. The new steamer will be 110 feet in length and 28 feet beam, and will be supplied with a compound engine capable of driving the vessel at a speed of 15 miles an hour. It is expected that the vessel will be built at Westport and will cost about \$20,000.

S. S. Bailey of Seattle, Wash., is at the head of a company which has just awarded to the Sumner Iron Works of Everett, Wash., the contract for a steamer for Alaskan service. She will draw 16 inches of water when launched and will have a capacity of 90 tons of freight and 150 passengers. It is proposed to build a second similar boat, the two costing in the neighborhood of \$50,000.

Tug Pawtucket, building for the United States government at the Mare Island navy yard, Cal., has been successfully launched. She is 102 feet over all, of 225 tons, and is expected to develop 450 horse power and 12 knots. Engines will not be completed for several weeks yet.

The Brown Hoisting & Conveying Machine Co., Cleveland, has closed a contract with the Bethlehem Iron Co. for coal and ore storage plants. There will be a plant of 50,000 tons capacity for the storing of coal and a 100,000-ton plant for storing ore.

A five-masted schooner building by N. T. Palmer, Bath, Me., will be launched Dec. 10 and will be followed on Dec. 21 by another five-master building by H. M. Bean of Camden, Me., for Capt. Crowley of Taunton, Mass.

The New Jersey Dry Dock & Transportation Co. of 1 Broadway, New York, and Elizabethport, N. J., is receiving estimates for an iron plant consisting of sufficient machinery to do the repairing of iron and steel hulls.

The Jackson & Church Co. have been incorporated to take over the business of Jackson & Church, Saginaw, Mich., who operated a machine shop, foundry and boiler shop. The company will have a capital stock of \$75,000.

The Harlan & Hollingsworth Co. broke all records last week when they resheathed the steamer City of Key West at their yard at Wilmington, using 2,100 sheets of copper, each 14x28 inches, in about four days.

Hall Bros. of Port Blakeley, Cal., have launched the schooner Bessie E. Stevens, building for the Pacific Commercial Co. of San Francisco. She is 50 feet long, 15 feet beam, 6 feet depth, and will cost \$3,500.

A report is in circulation to the effect that the Boston & Bangor Steamship Co. will build a new steamer which will be 15 feet longer than the City of Bangor.

A double-decked four masted schooner launched last week at the ship yards of Washburn Bros., Thomaston, Me., has been named the John O. Haynes.

NEW HAMBURG-AMERICAN LINERS.

It is doubtful if in the history of shipping any one corporation has had building at one time the aggregate tonnage now on the stocks for the Hamburg-American line. The great size of the vessels under construction is a distinctive feature. Mr. Emil L. Boas, general manager of the line, has furnished the Review with a complete list of the vessels upon which operations are under way. The largest of the fleet is the Deutschland, building in Germany, and which is 685 feet over all, 66 feet beam, 42 feet depth, 16,000 tons displacement, 33,000 horse power, and will have a speed of 23 knots. Also building in German yards are the Graf Waldersee and the Patricia, each of 12,800 tons burden, and the Batavia and Belgravia, each of 10,960 tons, in addition to a cargo steamer of 15,000 tons just ordered and which has not yet been named. Building at Belfast is the Belgia of 10,960 tons, while at Glasgow are the Bengalia and Betania, vessels of 7,800 tons. A sister boat, the Boenia, also of 7,800 tons, is under way at Yarrow. Also under contract with ship builders in Germany are two mail steamers of 10,200 tons each for the east Asia service, a freight steamer of 6,800 tons, and the Saxonia of 4,900 tons.

POSTIVE SHIPPING POLICY

PROJECT FOR THE CREATION OF AN AMERICAN SEAGOING MERCHANT FLEET RECOMMENDED BY THE SECRETARY OF THE TREASURY—ITS DETAILS AS SET FORTH IN THE REPORT OF THE COMMISSIONER OF NAVIGATION—NO DIPLOMATIC DIFFICULTIES OR POLITICAL QUESTIONS TO BE RAISED.

Washington, D. C., Dec. 7.—The annual report of Navigation Commissioner Chamberlain is devoted mainly to statistics and facts in support of the project for the creation of the American merchant marine recommended by Secretary Gage. Excluding the Great Lakes, practically shut off by Niagara Falls from foreign competition, the tonnage of vessels entered and cleared at seaports of the United States in foreign trade for 1897 comprised 7,248,825 tons American and 32,632,419 tons foreign shipping. If a line be drawn everywhere 1500 nautical miles distant from our seacoast, trade between foreign ports inside that zone and the United States comprised 5,179,969 tons American, and 5,213,293 tons foreign shipping. In oversea navigation to foreign ports more than 1500 miles distant, American shipping amounted to only 2,068,856 tons compared with 27,419,028 tons foreign. Only three practical courses, at the present time, are open to the United States:

First. We may retain our laws unchanged, ignore national navigation, and continue to rely on vessels under foreign flags for the transportation of our exports and imports.

Second. We may permit foreign-built vessels to register under the American flag, ship crews abroad and increase national navigation.

Third. We may extend direct government aid to vessels built in the United States, and thus increase both national navigation and national ship building.

The last named of these three courses is suggested to a very great extent by our new relations to the rest of the world, which expects the United States to become a maritime power. For the first time we now hold and shall doubtless permanently hold inhabited territory beyond the limit of the North American continent. If all that such possession involved were the physical force to keep those domains against all comers, the vote of some extra tens of millions every year to the army and navy would be sufficient. The flag of the United States should be more than the token of conquest by superior strength. Our maritime position must correspond to our pretensions, and to attain this result American ship yards and American ships must be increased, and reasonable contributions from the treasury toward this result should not be begrudged.

COMMERCIAL CONTROL OF THE PACIFIC.

Nations and individuals that dissent from the general theory of government aid to private enterprise concede on political grounds an exception in favor of ship building and navigation. Largely through indifference, we have lost the share in transatlantic navigation which was once ours. The growing trade of the Pacific is rapidly slipping away from us. Excluding Hawaii, entries and clearances from Asia and Oceania at ports of the United States in 1880 amounted to 233,960 tons American shipping and in 1897 to only 221,438 tons, while foreign shipping increased from 431,242 tons to 924,720 tons. Foreign nations are now skillfully following the policy of government aid to develop their navigation in the Pacific. Toward steamship lines to the east coast of Asia alone, Great Britain last year contributed \$1,250,000, France \$1,217,000, Germany \$480,000, Spain \$416,000, Russia \$405,000, Austria \$306,000 and Italy \$277,000. The United States paid only \$40,000 to American lines to Asia at regular mail rates. We have deluded ourselves into the belief that the Pacific trade will become ours without taking ordinary precautions to meet competition. Liberal extracts are published from the report on which the Reichstag last year increased 5,590,000 marks subsidies to German vessels in the Pacific, showing that Germany is already endeavoring to forestall the United States in securing commercial control of the Pacific.

The act of 1891 was designed to secure the largest and quickest steamships in the world for the American service on the Atlantic. Marine construction, however, has already advanced beyond size and speed contemplated when that act was passed. It has proved inadequate for the Pacific. Its maximum rates for that trade are \$2.30 per nautical mile outward for a 16-knot steamship. The British government pays \$2.82 to the Peninsular & Oriental and \$3.40 to the Canadian Pacific lines; the German government \$2.54 to 14-knot vessels of the North German Lloyd; and the French government \$3.23 to the Messageries Maritimes for the equivalent or an inferior service to Asia.

Spain imposed annual charges of \$580,000 on Cuba, \$125,000 on Porto Rico and \$170,000 on the Philippines for steam communication, and herself contributed \$1,000,000 more for that purpose. The Spanish total is about double the entire support the United States gave to American steamships in 1897. The obligations we have assumed by taking Porto Rico and the Philippines, annexing Hawaii, and governing Cuba, thus require us to make larger appropriations for the merchant marine, or to confess our weakness by abandoning navigation to Great Britain, France and Japan.

QUALIFIED ADMISSION OF FOREIGN SHIPS.

We must also take steps for the qualified admission of foreign ships to American registry in order to enter immediately into active competition for Asiatic trade. The act of 1891 calls for 5,000-ton steamships of 16 knots. We have only ten seagoing steamships of over 4,000 tons. Four of these are American trans-Atlantic liners and two New York and Cuba mail liners, already under postal contract. The Arizona, 5,300 tons, 16 knots, is the only vessel complying with the requirements of the act of 1891, and she was admitted by congress last June to American registry and bought by the war department. The China admitted by congress at the same time, is 4,940 tons, 17 knots. The two remaining vessels are the

City of Peking, 5,080 tons, but only 14 knots, built in 1874, and the El Rio, owned by the navy under the name of Dixie.

It will require at least 18 months to build vessels of over 5,000 tons and 16 knots needed to meet new conditions in the Pacific. Meanwhile a combination of four large German lines, aided by the Reichstag, is hastening to completion steamships to carry out German imperial policy in Asia.

A relaxation of the registry law was necessary to establish our trans-Atlantic line, and a similar relaxation is now necessary to meet conditions on the Pacific. It is proposed that foreign built vessels be admitted to American registry on condition that equivalent tonnage be built in the United States, as was done in the case of the Paris, New York, St. Louis and St. Paul. The admission of 40,000 tons of foreign shipping by congress last spring and the purchase of nearly 100,000 tons of foreign shipping by the war and navy department furnishes another precedent. By a similar policy, Germany has built up within fourteen years its great ship yards. From 1885 to 1891 the North German Lloyd spent \$7,500,000 in German and \$9,000,000 in British yards, while from 1891 to 1897 it spent \$10,000,000 in German yards and only \$1,500,000 in British yards.

EXPENDITURE REQUIRED NOT EQUAL TO SUGAR BOUNTIES.

The report considers differences in cost of construction and operation under the American and British flag, and concludes that on the average for cargo steamships now generally in use by foreign nations, this difference amounts to about 1 cent per ton each 100 nautical miles. The French navigation bounty rate for such vessels is 2.1 cents, the Italian 1½ cents and the Japanese 1¼ cents. On the basis considered, an average annual expenditure of about \$5,000,000 for twelve or fifteen years, aided by industrial development, will give the United States a becoming maritime rank. This sum is substantially the expenditure for sugar bounties under the tariff of 1890. By investing the necessary capital, the United States can become a ship building power superior to Germany and a close competitor with Great Britain. This autumn we exported plates for the largest steamship now on the ways in Great Britain. Five years ago we imported the plates from Great Britain for our first large steel square rigged ship.

The project to develop ship building by discriminating duties is in conflict with out treaties and its advocacy at this time involves an indefinite postponement of action and in the end retaliation. The proposition to pay bounties on exports is not feasible as our treaties bind us to pay the same bounties on exports in foreign vessels as in domestic vessels.

Trade between the United States and Porto Rico now by executive order restricted to American vessels should be so confined by statute. This step is desirable, not chiefly on account of the direct trade, which is not large, but to furnish a base of operations for American navigation in the Caribbean and Gulf, incidental to our newly-won political prominence in that sphere. In December Great Britain proposes to subsidize four British lines in the West Indies, in addition to the subsidy of \$400,000 already paid to the Royal Mail line.

The restriction of trade between the United States and Hawaii to American vessels is even more important for analogous reasons. Of that trade, 80 per cent. is already carried on by American vessels, and over 10 per cent. of the remainder by Hawaiian vessels, which will doubtless be admitted to American registry by congress. American vessels now leaving in ballast will suffice to supply the transportation requirements of the islands, if foreign vessels are withdrawn. Almost the entire value of the annexation of Hawaii to the development of American navigation in the Pacific is involved in treating the islands as an extension of our boundaries, bringing us from 1,500 to 2,000 miles nearer the markets of Asia and Australia. The opposition of British and German interests to the proposition is anticipated in the line of their consistent policy by subsidies to develop their shipping on the Pacific. The restrictions proposed, however, is in strict accord with our national policy and with out treaties, and does not interfere with existing trade relations.

REVISION OF TONNAGE TAX LAWS.

A revision of tonnage tax laws is proposed. We now charge 30 cents per ton annually on vessels in oversea navigation, which is much less than the charges of Great Britain, Germany, France, Italy and Norway. A steamship on twelve trips pays 30 cents annually at New York, \$1.05 at Liverpool, \$1.26 at London, and 96 cents at Hamburg or Bremen. Our expenditures for maritime safe-guards and improvements are vastly greater than those of any other nation, amounting to \$16,000,000 annually for the last decade, toward which shipping has contributed barely 3 per cent. Our principal and most costly improvements are directly for the benefit of foreign shipping, which enjoys over four-fifths of our foreign carrying. A table of the fifty largest steamships in the world is printed, of which only four are American. Of these, thirty-three make New York a terminal port, while only seventeen enter at Liverpool, and less than ten make any other foreign port a terminal. This table fore-shadows large federal expenditures for harbor improvements, which in Great Britain are met by charges on shipping. We have recently expended \$6,000,000 on Galveston harbor and channels. Since 1890 American tonnage in foreign trade at that port has decreased from 17,000 tons to 3,000 tons, while foreign shipping has increased from 260,000 tons to 1,012,000 tons. The United States, of course, derives great benefit from such improvements, but as they are made gratuitously in this country, the proposition is considered reasonable that foreign shipping should contribute at least a fair share toward lighting our harbors and seacoasts, which costs about \$3,000,000 annually.

The report also considers legislation for the improvement of American seamen, pilotage charges, seaworthiness of vessels, allotment of wages and other matters. The annual statistics of the report were published in October.

General Manager Newman of the Cleveland & Buffalo Transit Co. is pleased with the performance of the side-wheel passenger steamer City of Erie, which a few days ago made the run from Cleveland to Lorain—a distance of 30 statute miles according to the United States hydrographic office chart—in one hour and sixteen minutes. Slack coal was used and it is claimed no special effort for speed was made, the run being designed to test a new log with which the vessel was equipped.

AN IMMENSE PROJECT.

MR. COLLIS P. HUNTINGTON OUTLINES THE PLAN OF VICKERS, SON & MAXIM TO BUILD SHIPS AND GUNS AT NEWPORT NEWS, VA.

Mr. Collis P. Huntington, principal stockholder in the Newport News Ship Building & Dry Dock Co., has finally given out a statement relative to the reports in circulation for some time past to the effect that the English firm of Vickers, Sons & Maxim has been negotiating for an interest in the Newport News plant. Mr. Huntington's statement is as follows:

"I have been in negotiation with the Messrs. Vickers, Sons & Maxim, who have thought of taking a large interest in the plant and of establishing at Newport News, in connection with the ship yard, a very extensive plant for the manufacture of guns. If these negotiations should be carried to a conclusion, there would be established at Newport News a new and important industry. But the yard would continue to be an American enterprise, as I do not propose to sell my holdings outright, but to retain a large interest. I would like, however, to lessen my cares and responsibilities, and let others take up and carry on the work that I have started. Mr. Crosley, Mr. Dunn and Mr. Loewe came over from England to look about, and while here examined my ship yard most thoroughly. I learned that they expressed themselves as very much pleased with it.

"The proposed gun plant would not be a separate organization. It would be conducted as a part of the general business. I have wanted to get those people to take a large interest, because I was anxious to see a great gun manufacturing establishment put up at Newport News, and my impression is that my English friends will find it very greatly to their interest to complete the negotiations. I think, too, that it will be a good thing for our government. The Vickers, Sons & Maxim are known over the whole world for their skill and success in making great ships and all sizes of guns. Their experience would be invaluable at Newport News, and they would find there advantages which I do not believe can be had anywhere else to the same extent.

"As for the ship building part of the proposition, I believe we now have at the head of our various departments as good, as practical and as successful ship builders as there are in this or any other country. If this new element should come into the ownership they will have nothing to do in the way of increasing the capacity and facilities of the Newport News ship yard, as what has been done and what is now under way will provide the yard with the most complete equipments for heavy and rapid work that could be devised. We have started our new dock, and the work is progressing finely. We have already driven, I believe, something like 10,000 piles and are excavating the ground rapidly. There is quite a hole to be dug, as you can understand when you consider that the dock is to be 850 feet long, with a gate of 100 feet and with 30 feet of water over the sill. The granite necessary in the construction of the new dry dock is now being cut. We are extending one of the piers and putting up a large beam shed and a mill for the manufacture of numberless brass appliances which must be used in ships, particularly in government vessels. We are also putting in a number of ways, with the necessary traveling cranes over them for the transportation of the heavy metal which must be carried to all parts of a great modern vessel.

"Of the gentlemen connected with Vickers, Sons & Maxim who visited the yard, Mr. Crosley is a man of large means and great experience in the building of ships. Mr. Dunn probably stands at the very head of naval experts, having been chief constructor to the British admiralty. I am informed that in the interest of his government he has also presumably inspected all of the battleships which have been built for the British navy during the last thirty years. If their firm should conclude to take hold of this establishment, which I have carried so far along at Newport News, it hardly needs my assurance that the business of the future, which will be done there in the way of manufacturing ships and guns, will be on the largest and most complete scale."

AMONG THE NEW BOOKS.

Almost invaluable as a pictorial record of the late war is "Cannon and Camera," a newcomer on the book shelves bearing the imprint of John C. Hemment as author. Mr. Hemment was the only photographer who was at the front throughout the entire period of the war. He was at Havana immediately after the wreck of the Maine and remained with Admiral Sampson's squadron throughout the entire period of the engagement at Santiago, securing innumerable photos of the wrecked vessels as they appeared immediately after the conclusion of the battle. These pictures, together with innumerable photos of the engagements on land—all of which have the greatest historical interest and value—are incorporated in the present volume, the reproductions being large and executed in the best possible style. The text tells, first of all, of course, of Mr. Hemment's experiences, and the charm of a personal narrative is therefore added to a concise, intense, realistic story of the war. Published by D. Appleton & Co., Fifth avenue, New York. Price \$2.

It is several years now since there appeared a volume of sea stories entitled "Many Cargoes" from the pen of W. W. Jacobs, then an unknown author. Nothing from a writer without a record of previous successes ever made a more instantaneous hit. Its humor was so unique that it arrested attention at once by its novelty, and everything from the locale to the phraseology of the stories indicated the author's entire familiarity with his field—the small English sailing vessel. Now a sequel to the previous volume has appeared under the title "More Cargoes," and, although it has been out but a few weeks, is already in its second edition. Like its predecessor it is pure comedy, and it would seemingly be difficult to find a book that will be more thoroughly enjoyed by persons conversant with shipping interests generally. Published by Frederick A. Stokes Co., New York.

The American Ship Windlass Co. has secured orders for the outfits of windlasses, towing machine, etc., for the steamer and barge to be built at South Chicago for the Minnesota Steamship Co. and also for the barge building by the American Steel Barge Co. at West Superior for the Bessemer Steamship Co.

REASONABLE PRICES.

ASSISTANT SECRETARY OF THE NAVY ALLEN DECLARES THAT EXCESSIVE PAYMENT WAS NOT MADE FOR NAVAL AUXILIARY VESSELS.

Assistant Secretary of the Navy Charles H. Allen in a report which he has just submitted, vigorously defends the department against the charges made in one way or another that excessive prices were paid for the yachts and other vessels purchased for service in the auxiliary navy during the war. He says:

"Inasmuch as the purchase of vessels from the merchant marine—yachts, etc.—was conducted by this office, it may be remarked that this work was managed with the utmost care as regards selection of vessels for their strength and adaptability to naval uses, as well as with respect to the price paid. The majority of these vessels were inspected by a board of which Capt. Frederick Rodgers, U. S. N., was president, and I take pleasure in commending the intelligence and fidelity with which the work of this board was carried out. In other cases special boards of officers were appointed to conduct the inspection. What I wish to emphasize especially is the fact that no vessel was purchased until after it had been thoroughly inspected and had been pronounced thoroughly satisfactory by officers whose professional training made them experts. Attention is called to the fact, which may not be generally known, that in the purchase of these vessels the same care for the government's interests on the financial side was exercised as would be the case with a private individual or corporation, with the effort, in every case, to make the best bargain possible. In the full tabulated detailed statement which I have furnished for Secretary Long's report, of the number of auxiliary vessels purchased, comprising the original name, the price asked, the price recommended, and the price finally paid, numerous instances will be found where the cost to the department was very much less than the original price asked, sometimes, indeed, less than the price at which the purchase was recommended by the board. When we began the purchase of the vessels there was scarcely any competition, and it is possible that prices were higher than could have been secured if it had been practicable to wait until competition brought lower figures. But it must be remembered that the law of supply and demand holds for the government as well as for private individuals, and that true economy and the best interests of the government made it the correct policy to pay a higher price for a vessel when her services were vitally needed rather than to suffer the government's interests to be jeopardized by waiting for a lower price. Not very long after the purchasing began the competition to supply ships became very active, and the department was then enabled to get vessels at very reasonable prices."

A MARITIME POLICY.

PRESIDENT MCKINLEY ADVOCATES IT IN HIS MESSAGE TO CONGRESS—RECOMMENDATIONS RELATIVE TO THE NICARAGUA CANAL—NAVAL PROGRAM ENDORSED.

The shipping interests of the country will undoubtedly be pleased with the stand taken by President McKinley in his message submitted to congress this week. His advocacy of a maritime policy and endorsement of the new naval program are particularly gratifying. With reference to the former he said:

"The annexation of Hawaii and the changed relations of the United States to Cuba, Porto Rico, and the Philippines, resulting from the war, compel the prompt adoption of a maritime policy by the United States. There should be established regular and frequent steamship communication encouraged by us under the American flag to the newly acquired islands. Spain furnished to its colonies, at annual cost of about two millions of dollars, able steamship lines communicating with a portion of the world's markets as well as with trade centers of the home government. The United States will not undertake to do less. It is our duty to furnish the people with facilities under national control for their export and import trade. It will be conceded that the present situation calls for legislation which shall be prompt, durable and liberal. The part which American merchant vessels and their seamen performed in the war with Spain demonstrates that this service, furnishing both pickets and the second line of defense, is a national necessity and should be encouraged in every constitutional way. Details and methods for the accomplishment of this purpose are discussed in the report of the secretary of the treasury, to which the attention of congress is respectfully invited."

In referring to the recommendation of the secretary of the navy for the construction of three battleships, three armored cruisers, three cruisers of 5,000 tons and six cruisers of 2,500 tons the president says: "The recommendations of the secretary of the navy relative to the increase of the navy, have my earnest approval. I also join with the secretary of the navy in recommending that the grades of admiral and vice admiral be temporarily revived, to be filled by officers who have specially distinguished themselves in the war with Spain."

The Nicaragua canal project is endorsed unqualifiedly and congress is urged, in view of certain circumstances that have arisen regarding the charter, to take action at once.

James Howden of Glasgow, inventor of the Howden system of hot draft, writes the Dry Dock Engine Works of Detroit that on Nov. 1 the books of his company showed a total of 825 Howden installations, with an aggregate I. H. P. of 2,313,600. Detroit owners of the steel freight seamer Clarence A. Black, built by the Cleveland Ship Building Co. and equipped with Howden draft appliances, seem to be especially pleased with their vessel. It is claimed that she can move a ton of freight a mile at 12 1-3 miles speed on the consumption of 41-100 of an ounce of coal. With a cargo of 220,282 bushels of wheat (6,608 net tons) on her last down trip she made 12 1-3 miles right along, it is claimed, at 87 turns, burning 2,130 pounds of fuel an hour. It is also claimed that she makes the trip to and from Lake Superior on 200 tons of fuel.

NEW DOTY COMBINED PUNCH AND SHEAR.

Two forms of combined punch and shear have been brought out by the New Doty Mfg. Co., Janesville, Wis. In the first, Fig. 1, there are two sets for flat iron and one for round iron, in addition to the punch. It is so arranged that the two sets for flat irons are each independent of the other and of the round iron knives, and all are independent of the punch, so that either part of the machine may be used independently of any other, as may be desired. The machine can punch a $\frac{5}{8}$ -inch hole in $\frac{1}{2}$ -inch iron and cut 4 by $\frac{1}{2}$ -inch iron or steel or 1-inch rod iron.

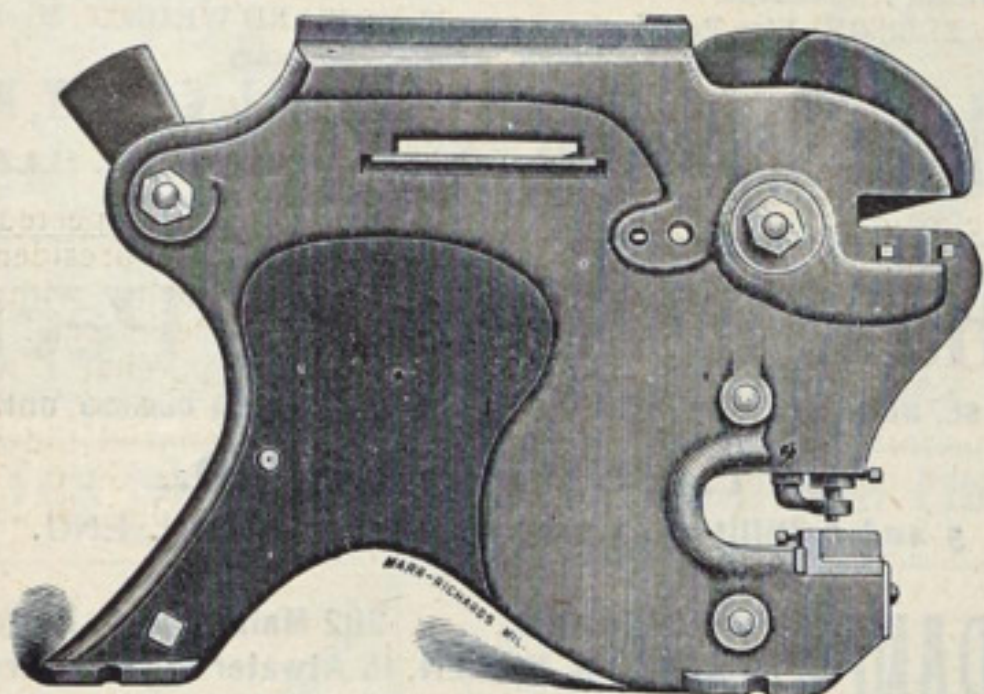


FIG. 1.—NEW DOTY COMBINED PUNCH AND SHEAR.

The round iron knives are made the reverse of the iron and so do not flatten it in cutting.

In the other machine, Fig. 2, the knives for flat and round iron are independent of each other and of the punch, and both sets of knives, as well as the punch, are at all times ready for use without any change. This machine is powerfully built. The boxes are cast solid, and the eccentric shafts are also cast in one piece. The motion of the machine

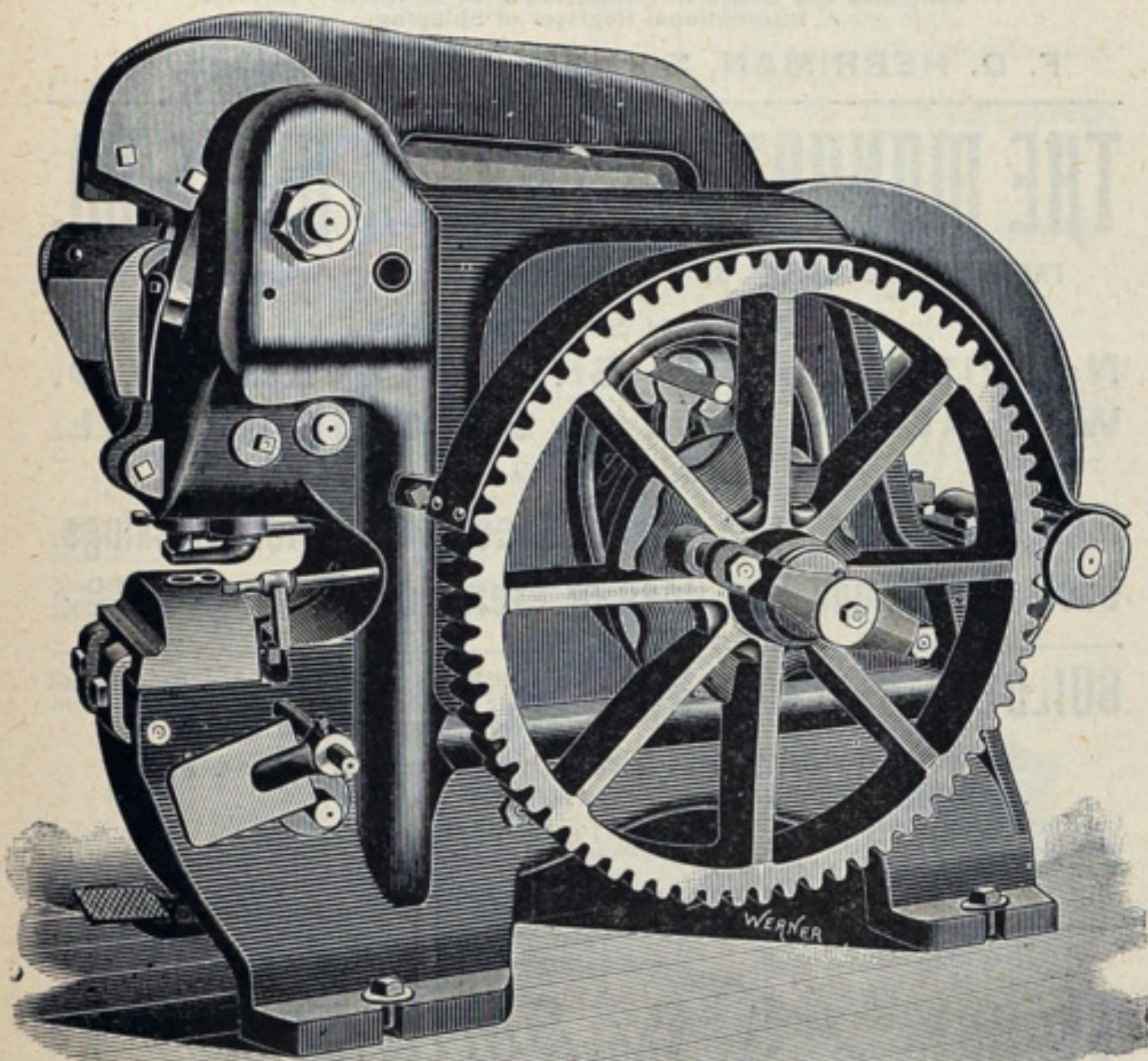


FIG. 2.—NEW DOTY COMBINED PUNCH AND SHEAR.

is controlled by a clutch and treadle. The stripper is adjustable to 0.001 inch and the punches and dies can be adjusted without stopping the machine. Before leaving the works these machines are tested to a strain in excess of that for which they are guaranteed.

TRADE NOTES.

The B. F. Sturtevant Co. of Boston, Mass., has just issued a second edition of their very suggestive pamphlet, bulletin E, entitled "Draft Without a Chimney." Bulletin G, another of the Sturtevant company's publications just at hand, treats of several types of generating sets with automatic horizontal and upright engines. We understand that these bulletins will be mailed on application.

The Review is in receipt of two supplementary catalogues lately issued by the Buffalo Forge Co., Buffalo, N. Y. Both are indeed worthy of mention. They are very artistically gotten up, with embossed covers, and contain a high class of half tone work. One of these catalogues is devoted to illustrating and describing the "Buffalo" down-draft forges, and the other the different types of automatic engines made by the Buffalo company.

Alike to a great many other manufacturers of high grade machinery in this country, the American Ship Windlass Co. of Providence, R. I., is gradually building up quite a large foreign trade. They received an order, a few days ago, from the agent general of Natal, South Africa, for a large capstan to be placed on a dock at that place. Another order of recent

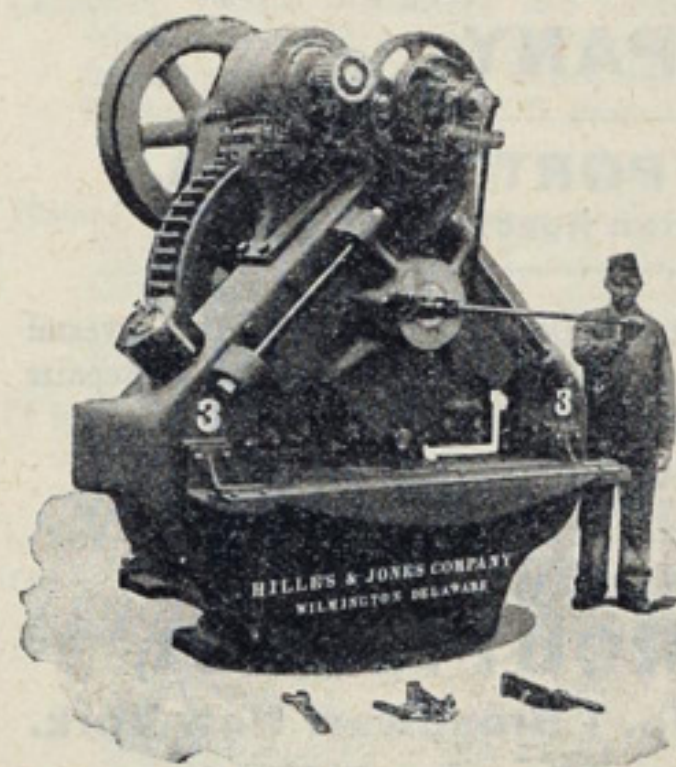
date is for a capstan to be placed on the caisson of a dry dock on the east coast of England.

W. D. Kearfoot, who some time ago took up a position with Mr. Wheeler in the marine department of the Geo. F. Blake Mfg. Co., New York, has evidently not lost sight of business acquaintances made on the lake. He dropped in on a few Cleveland friends the other day, after having closed an order with the Cleveland Ship Building Co. for compound vertical twin air pumps and compound feed pump for the Wolvin steamer building at Lorain.

The machinery and tools for the Mare Island navy yard, bids for which were opened in July, are now being delivered. The Hilles & Jones Co., of Wilmington, Del., shipped several carloads this week, including a motor-driven plate-bending machine for ships' masts and a heavy combined punching and shearing machine, also motor-driven. The depth of throat on each end of the latter machine was 42 inches, and with the exception of the method of driving, it is a duplicate of the machine illustrated in a recent issue of the Review.

DOUBLE ANGLE SHEARS WITH ELECTRIC MOTOR.

The double angle shears illustrated herewith is of a kind built by the Hilles & Jones Co. of Wilmington, Del., and recently furnished to the Wm. Cramp & Sons Ship & Engine Building Co. of Philadelphia. These



machines are furnished with electric motor, as shown in the illustration, with steam engine or pulleys for driving as preferred. This design is made in a number of sizes, larger or smaller than the shears shown in the illustration. The electric motor type is, of course, the modern machine. The motor is manufactured by the Storey Motor & Tool Co. of 464 Broad street, Trenton, N. J. It is of 10 horse power, slow speed. Storey motors are also well known in connection with hoists made by Williamson Bros. of Philadelphia. Ash hoists on the American line express steamers St. Louis and St. Paul are operated by these motors, direct connected. The Storey company, formerly of Philadelphia, now

has a large new plant at Trenton, N. J. They make a specialty of direct connected combinations of all kinds. Their motors are used for ventilating outfits, lathes, drills, launches, dynamos and in numerous other connections.

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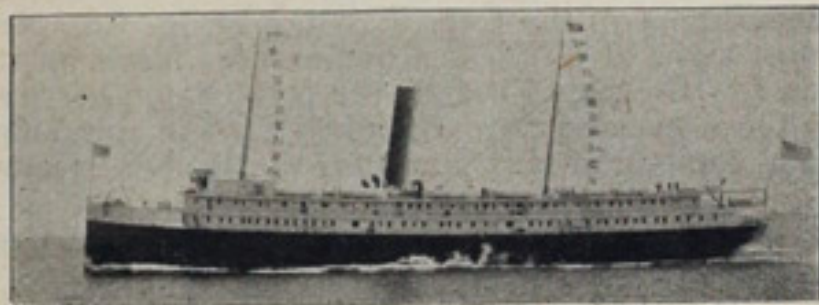
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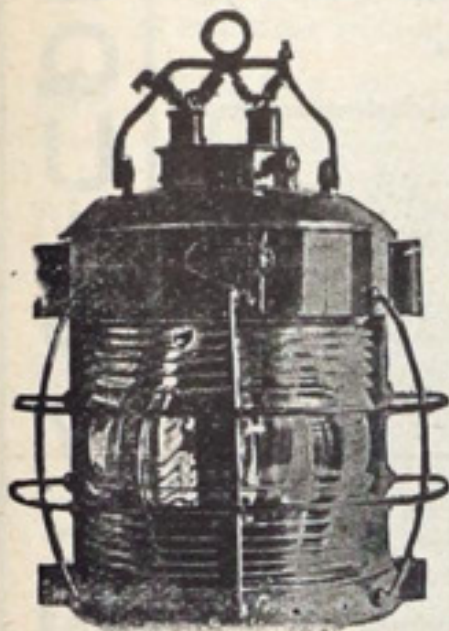


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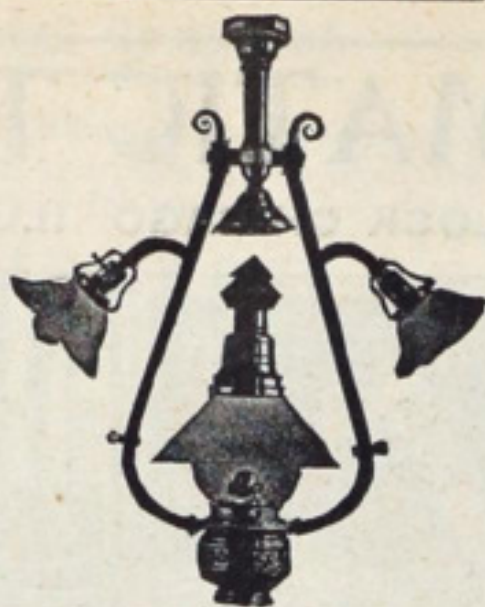
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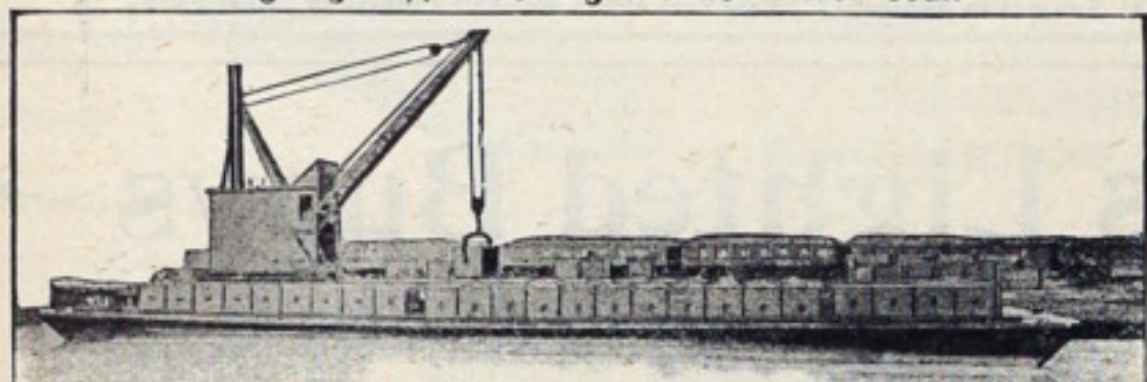
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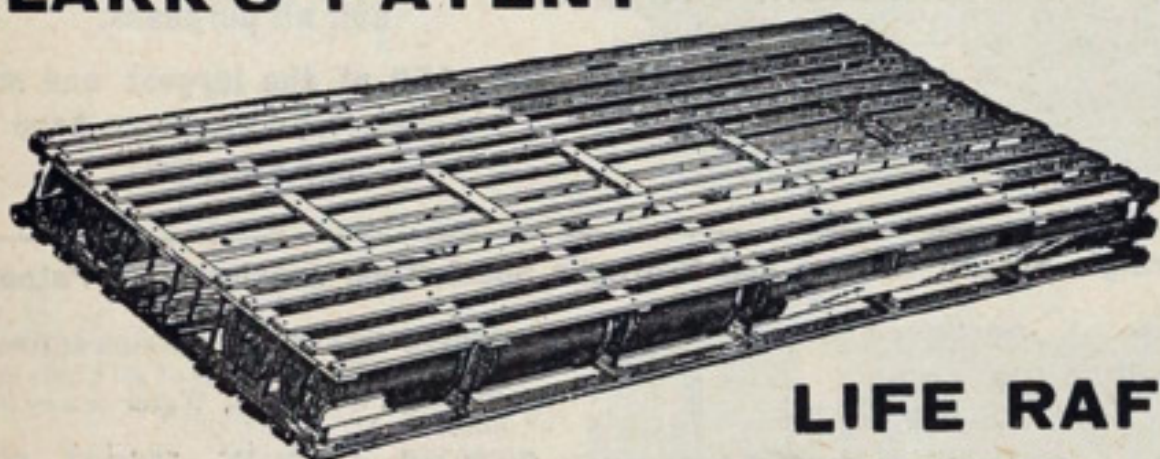
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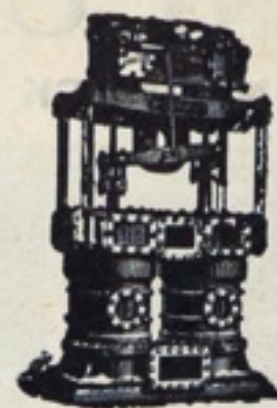
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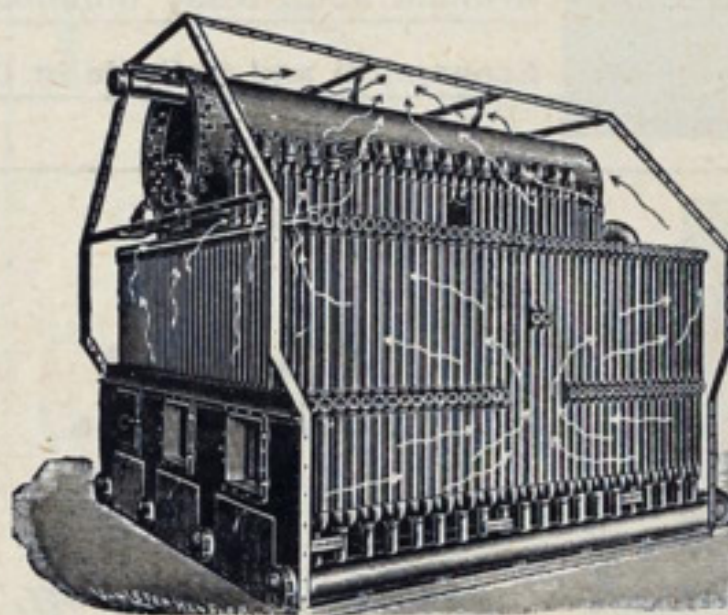
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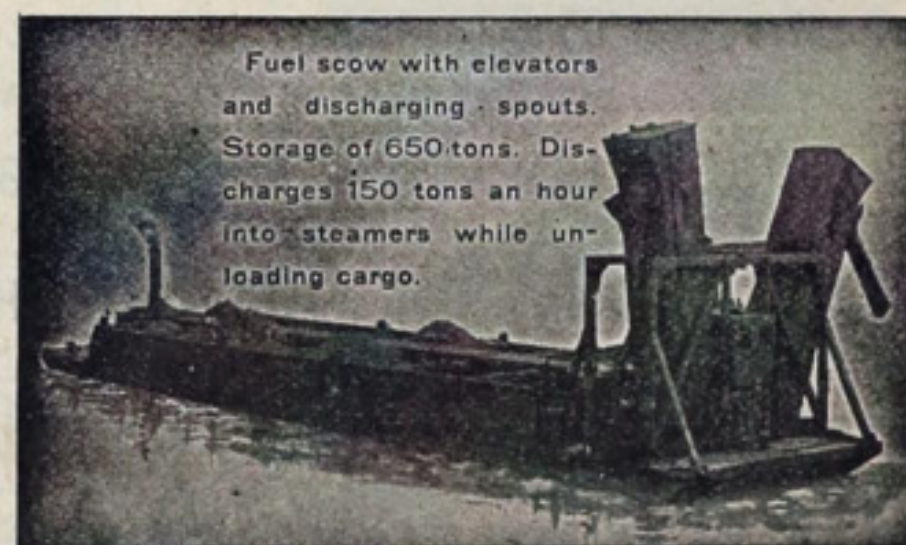
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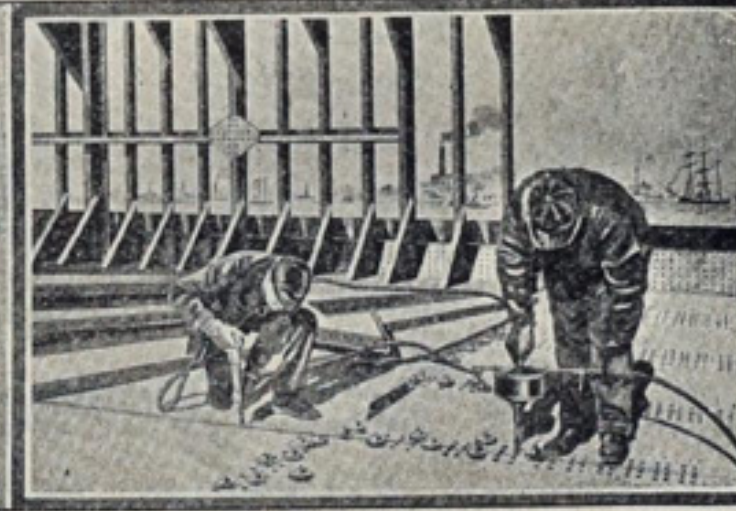
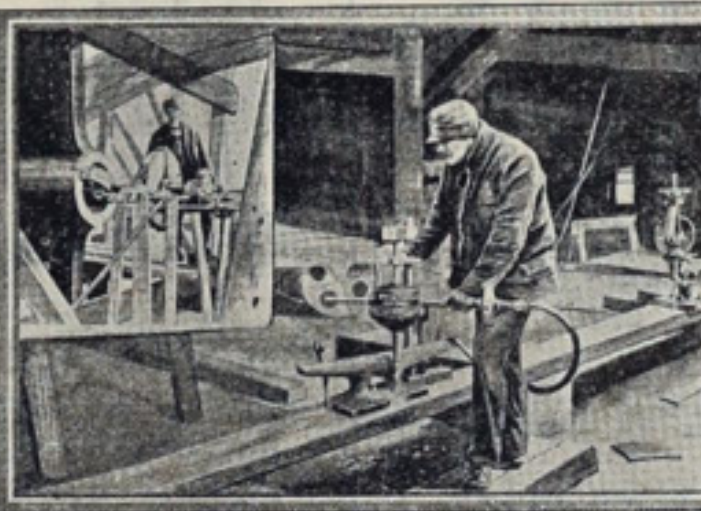


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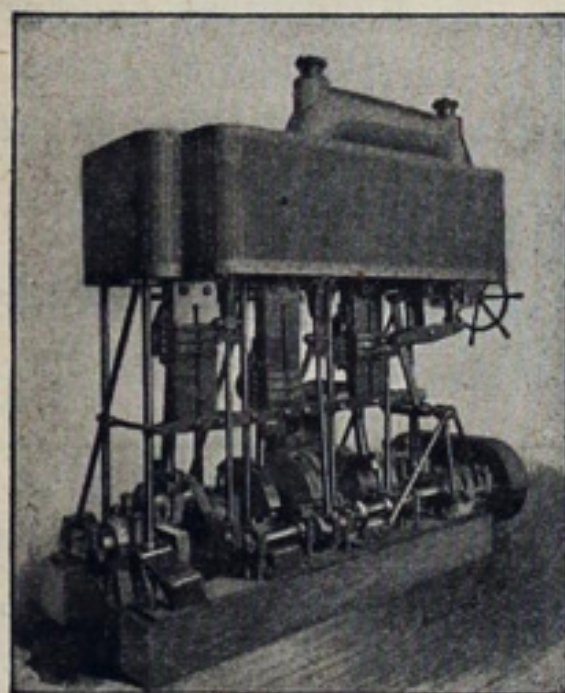
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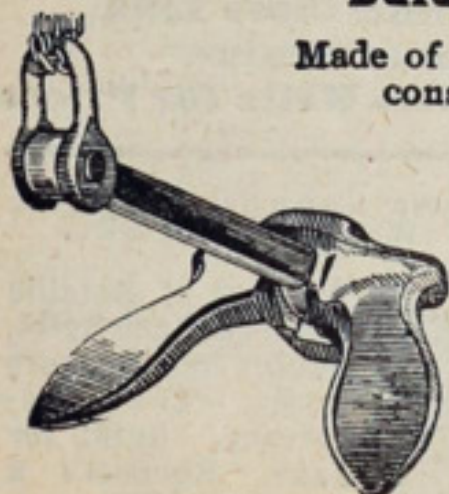
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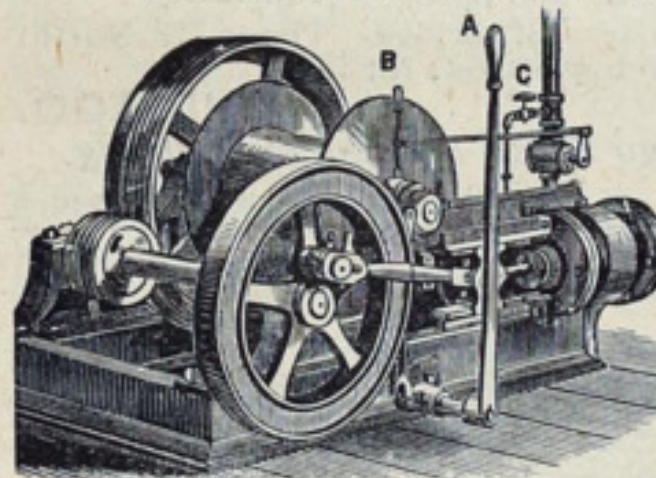
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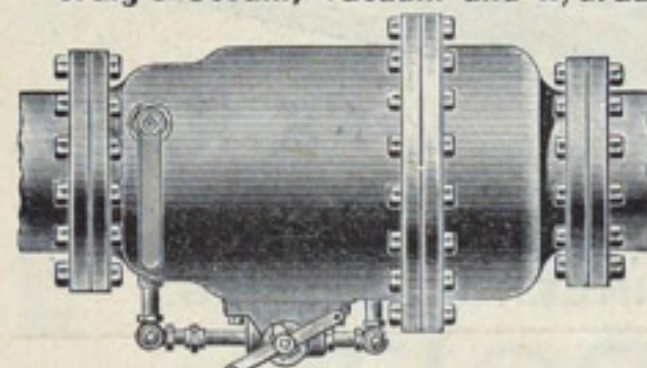


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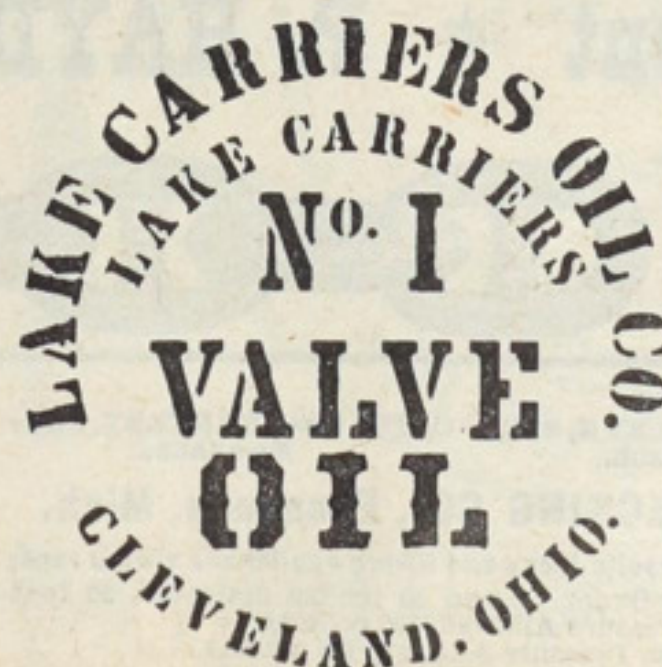
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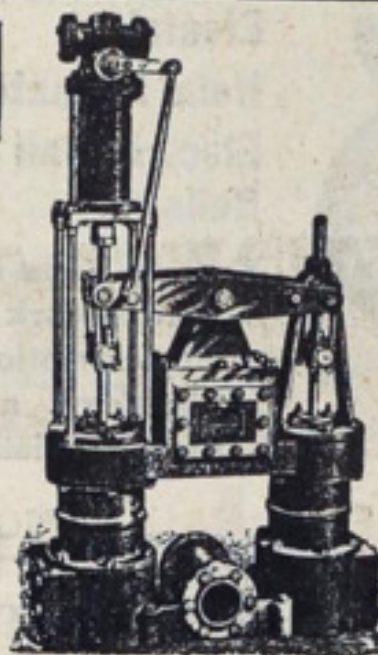
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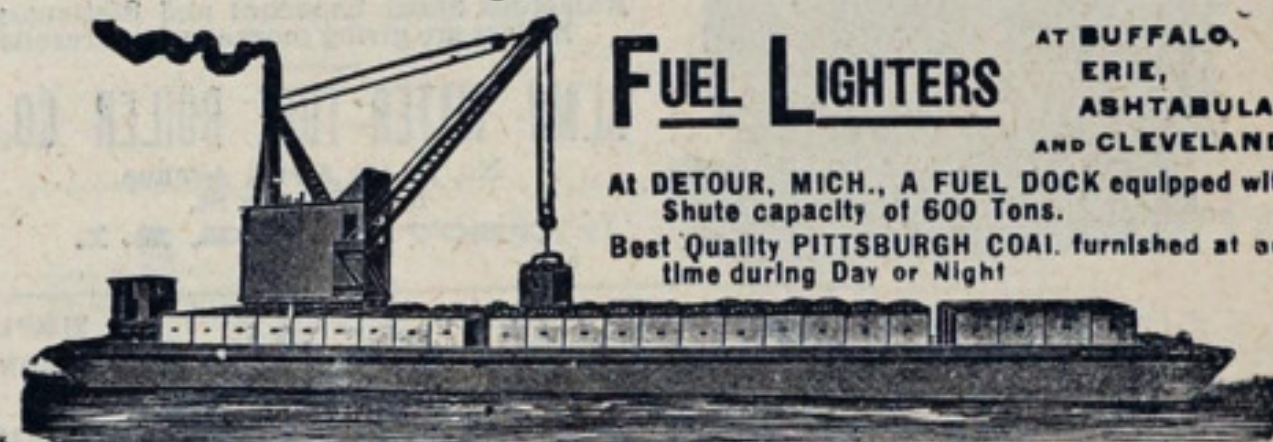
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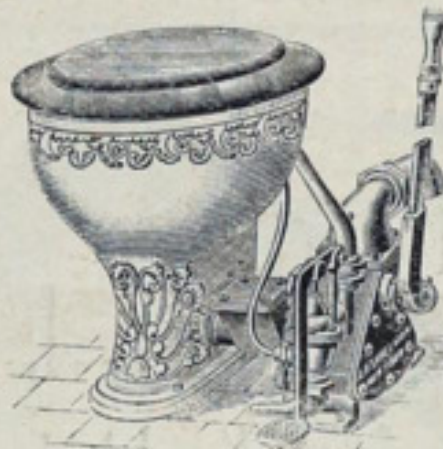


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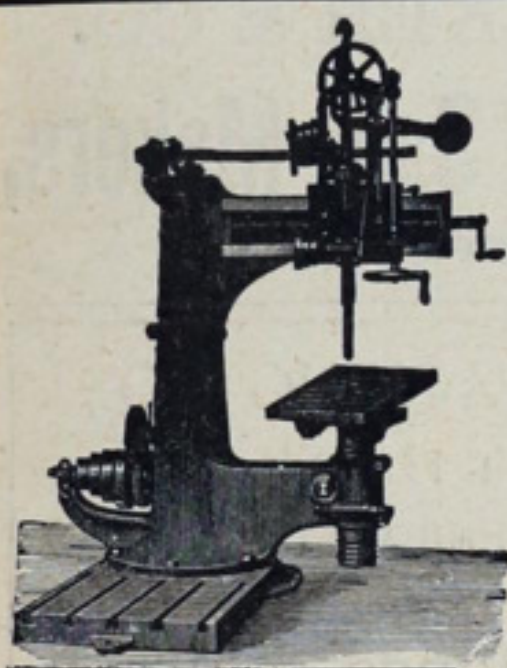
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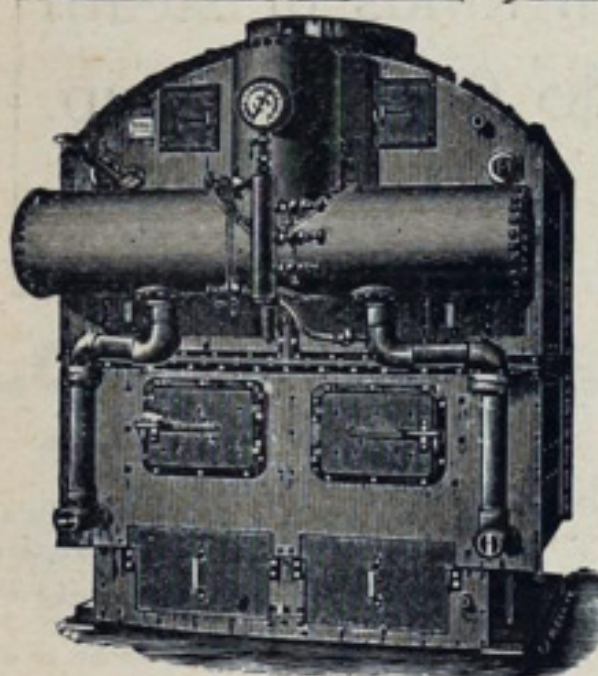
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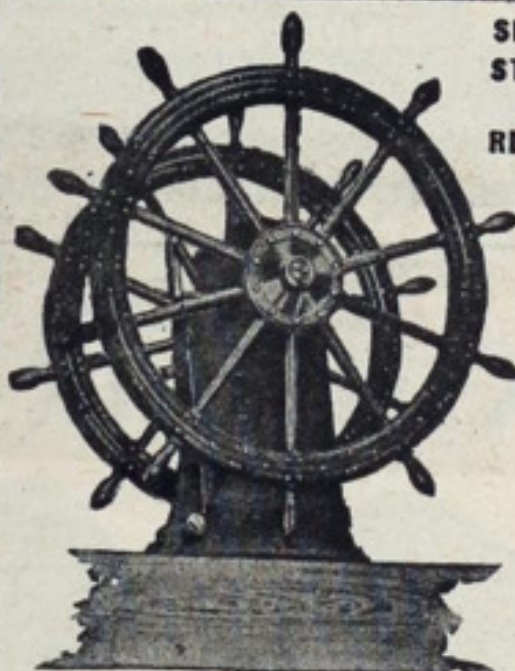
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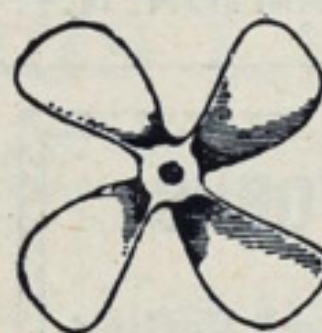
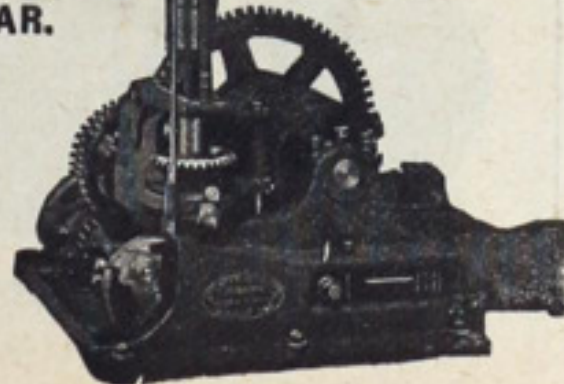


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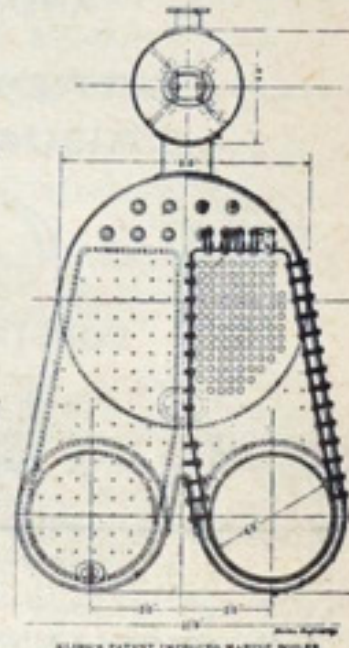
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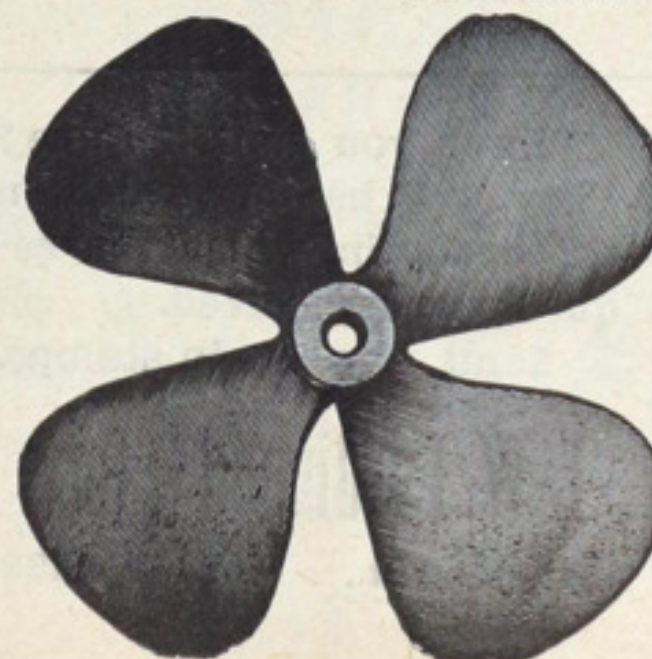
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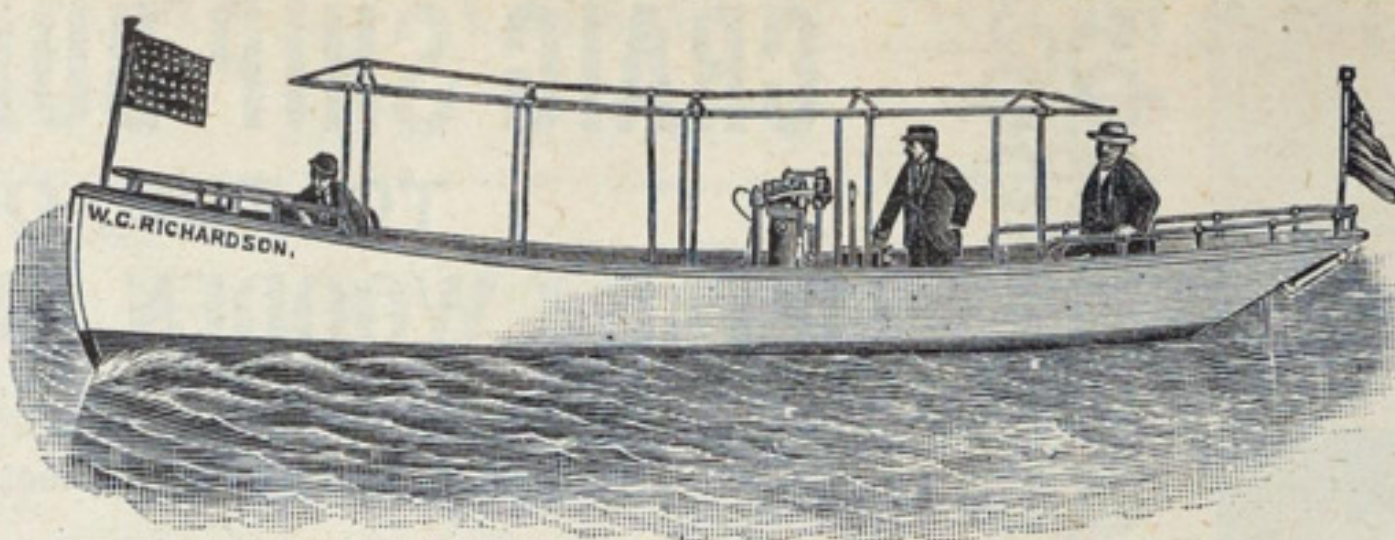


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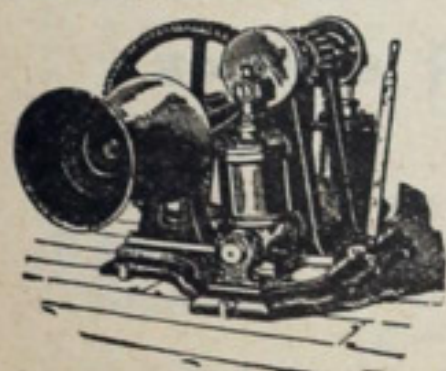
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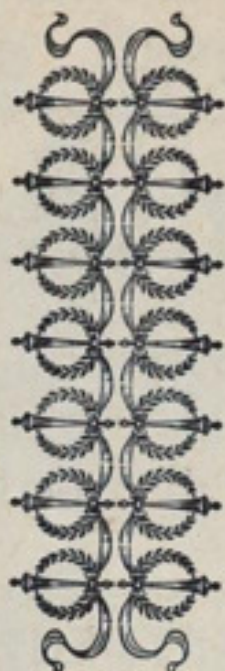
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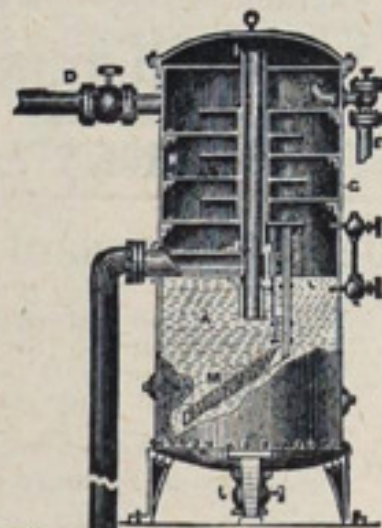
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Baker, Howard H. & Co.	21	Elphicke, C. W. & Co.	4	L. S. & M. S. Ry.	27	*Read & Sons, Wm.	20
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Bement, Miles & Co.	22	Escanaba Towing & Wrecking Co.	19	La Salle & Co.	18	Richardson, O. S., Fueling Co.	5
Berlin Iron Bridge Co.	22	Farrar & Trefts	27	*Learmonth, Robert	24	Roach's Ship Yard	18
Bessemer Steamship Co.	18	Falls Hollow Staybolt Co.	6	Lidgerwood Mfg. Co.	6	Roberts Water Tube Boiler Co.	19
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Brown, Harvey L.	4	Goulder, Harvey D.	4	Miller, Walter	20	Standard Oil Co.	14
Carr, J. B. Co.	21	Gordon, John & Co.	4	Monroe, Wm. M.	4	Standard Brass Works	28
Castner, Curran & Bullitt	27	Graham, James & Co.	5	Mackey & Bell	4	Standard Automatic Releasing Hook Co.	23
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Cory, Chas. & Son	22	Hoyt, Dustin & Kelley	4				
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Craig, William	20	Hyde Windlass Co.	28				
Crosby Steam Gauge & Valve Co.	8						
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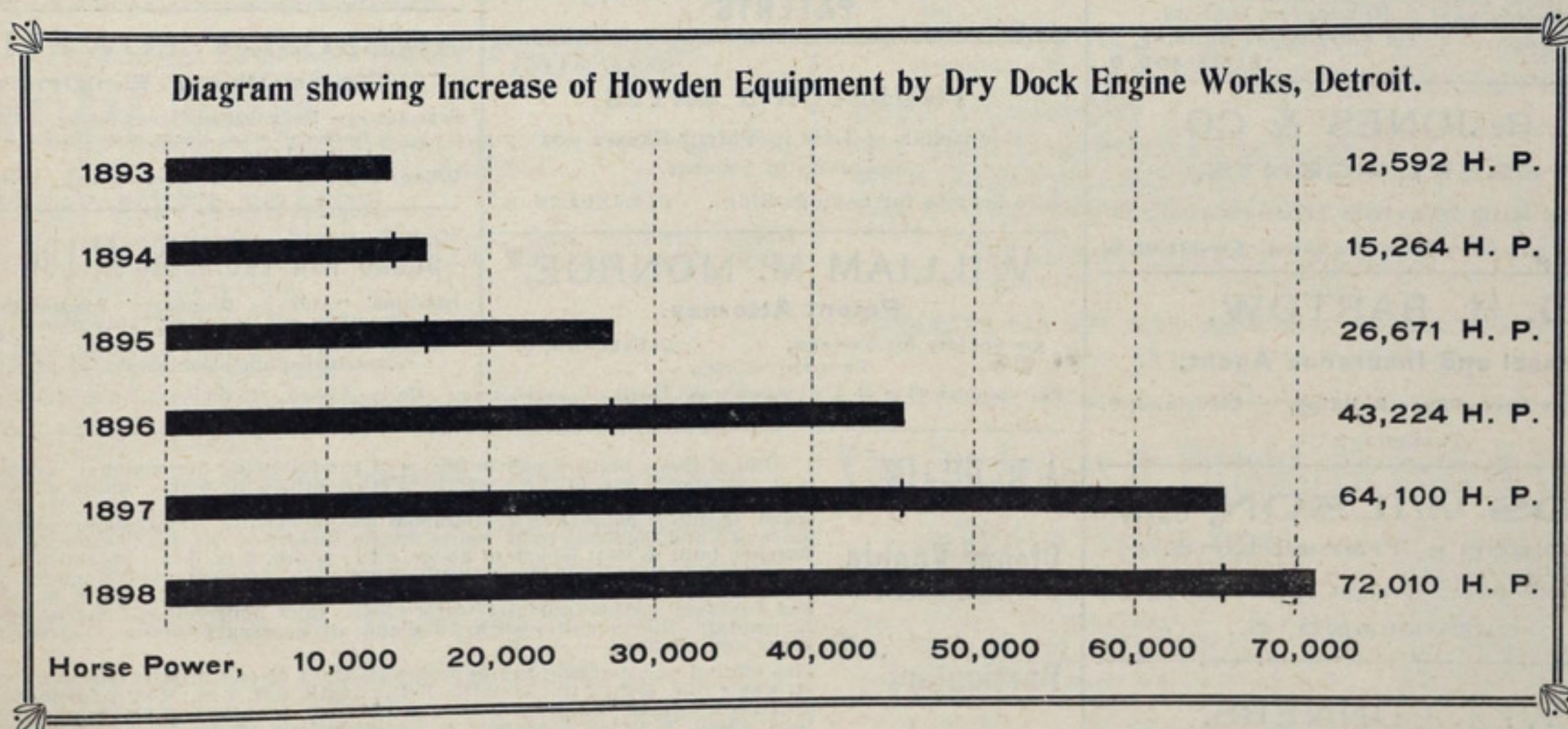
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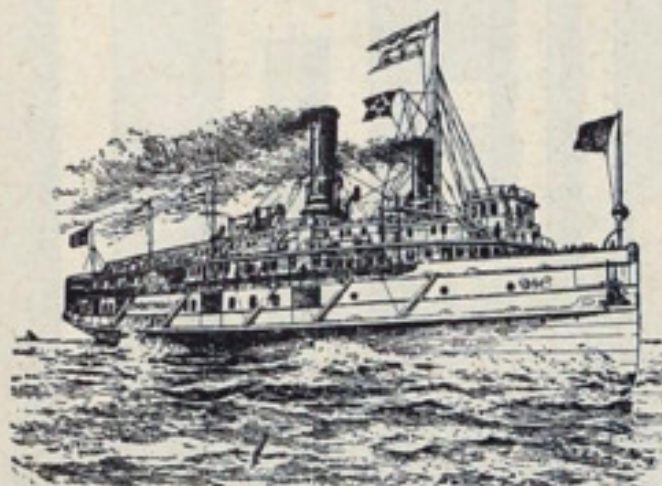
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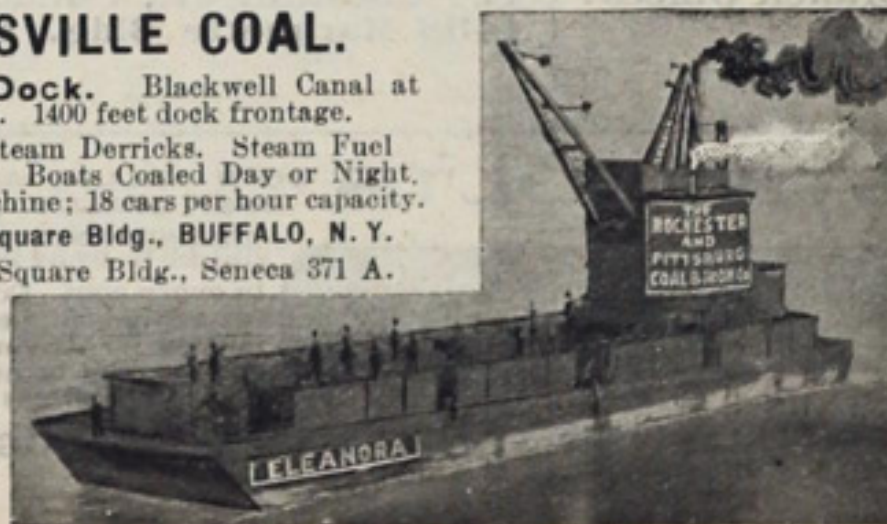
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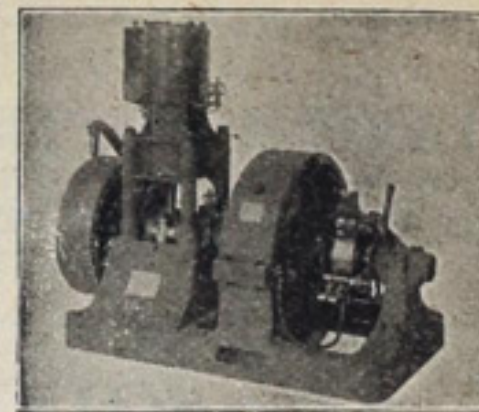
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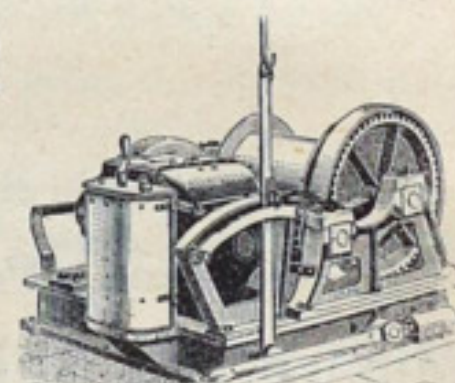
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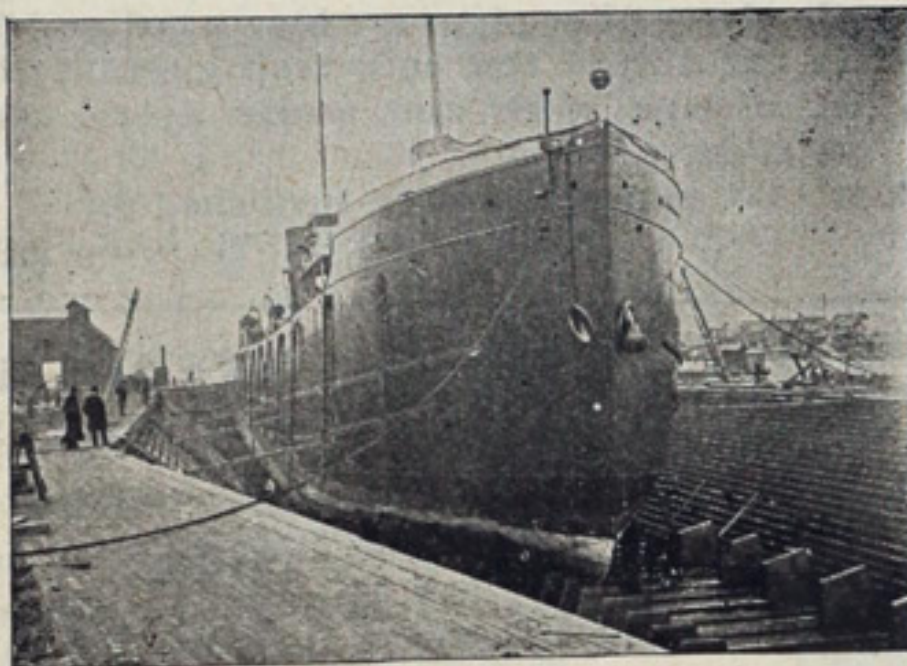


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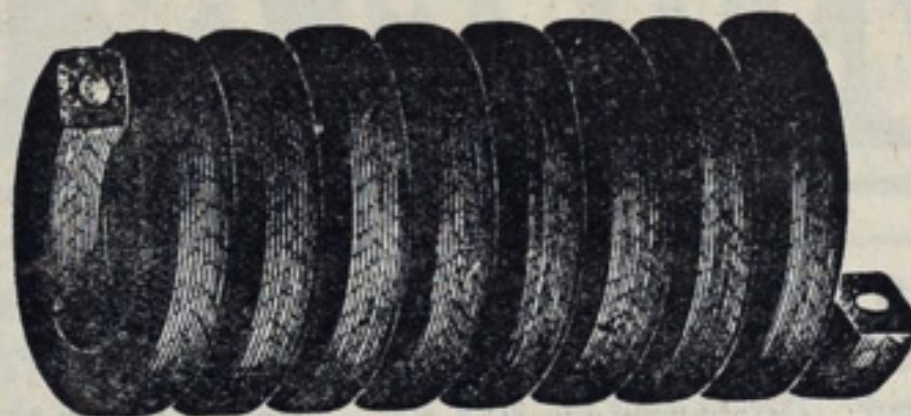
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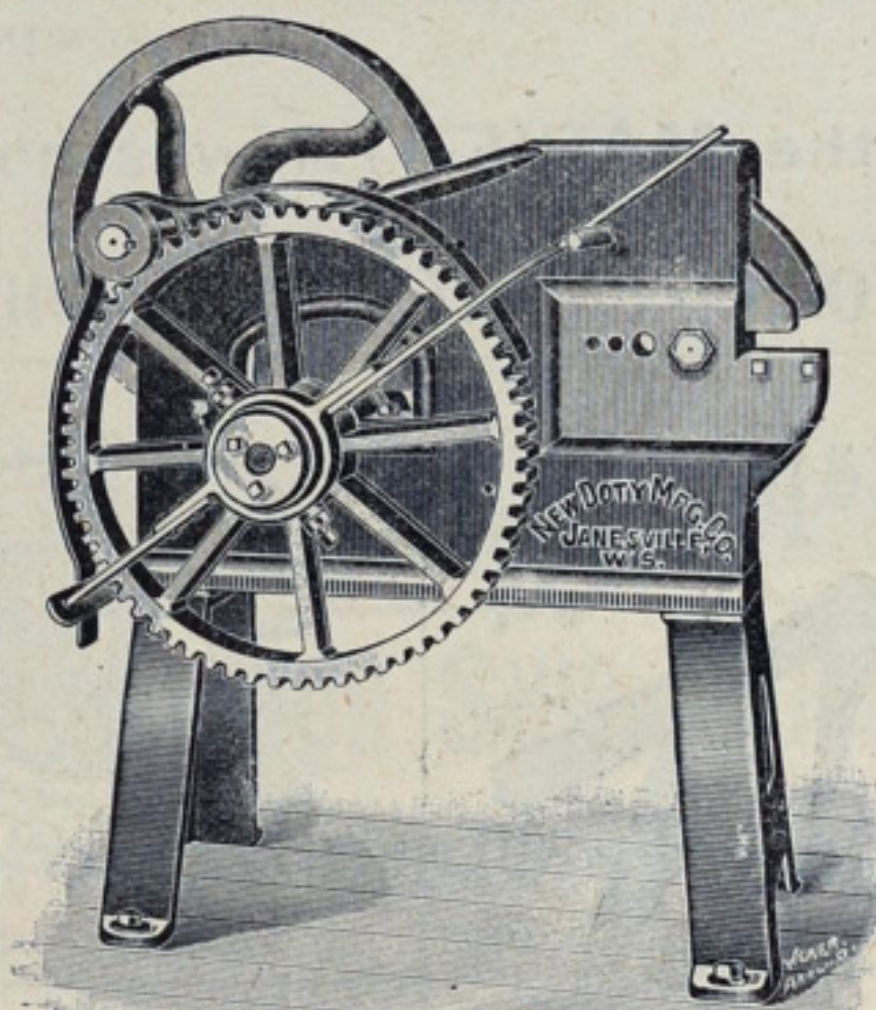
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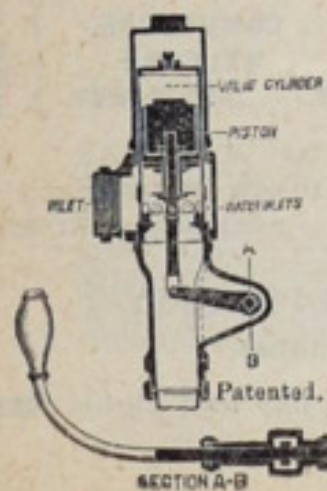
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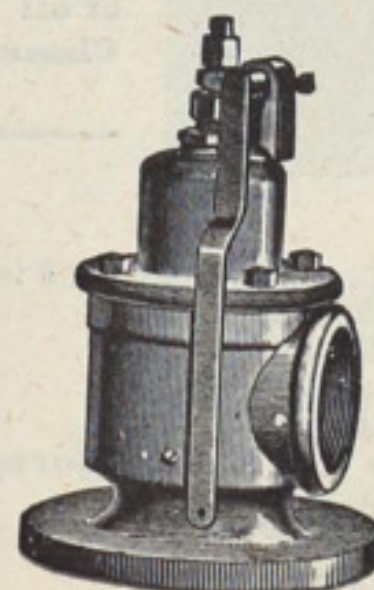


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